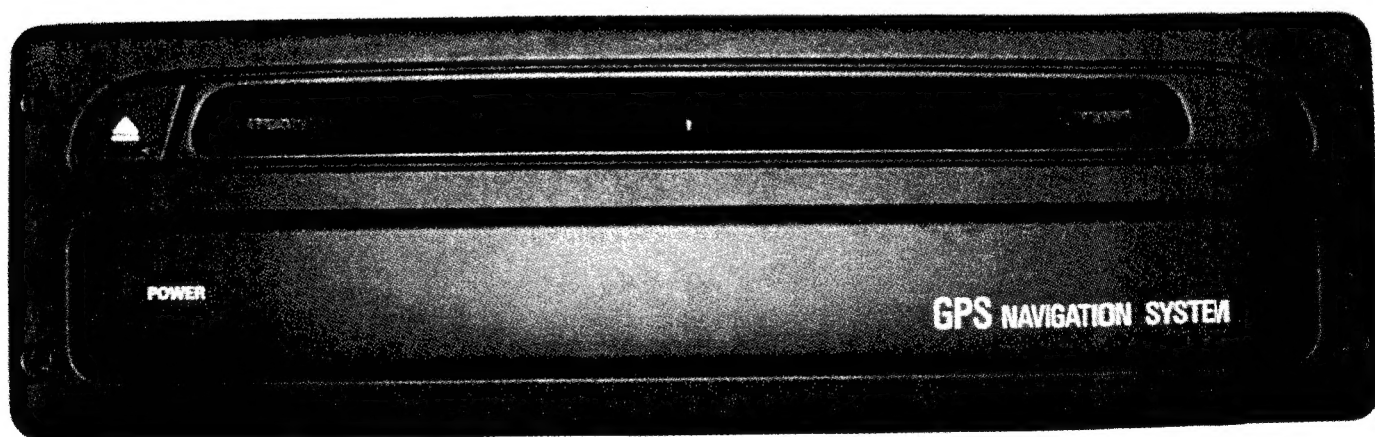


**22SY591/23/23S**  
**BMW CC-Mk3 Navigation System**

# Service Manual

12 V 



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## **WARNINGS**

**CLASS 1  
LASER PRODUCT**

### **DANGER**

Invisible Laser radiation when open.  
AVOID DIRECT EXPOSURE TO BEAM



### **ATTENTION**

Static Sensitive Devices  
Handle Only at Static  
Safe Work Stations.

## **Documents**

Beside this documentation the following information sources are available for service purposes:

- The service partslists 22SY591/23 & -/23S in the SAP System of Philips Consumer Service Eindhoven
- The service manual for the CD ROM drive CDM-M2/2.3, order codes 4822 725 25483 & 4822 725 25491
- The service manual for the CD ROM drive CDM-M2/8.3, order codes 4822 725 25491
- The service manual for the CC-Mk3 Test Software, order code 4822 725 25495
- The 'Instructions for Use', prepared by BMW

## **Navigation system BMW**

The Navigation System for BMW consists of the following parts:

- The navigation computer 22SY591/23 (hor. mounting) or 22SY591/23S (vert. mounting)
- The GPS antenna 22SY553/70
- The display, audio circuits, speakers and controls integrated in BMW car – are controlled by the analogue outputs and I/K (BMW communication) bus
- The interface cable set

## **General specification**

Ambient temperature	(functional)	-20 / +70°C
Ambient temperature	(full specification)	-15 / +55°C
Supply voltage	(SPIL functional)	6 - 16V
Supply voltage	(full specification)	9 - 16V
Supply voltage	(CD not operating)	6 - 9V min.
Supply current of BMW CC-Mk3 navigation system		0.5A typical <2A peak
Quiescent current of BMW CC-Mk3 navigation system		<100µA typical
Power-down delay time		under S/W control
Audio outputs (Voice)		22W at 4Ω at loudspeaker output; 3V <sub>eff</sub> on voice out line – at 470Ω
Voice S/N ratio		≥ 50dB (A-weighted)
Video outputs		R / G / B output (50Ω / 75Ω)
Video S/N ratio		≥ 40dB
Weight (BMW CC-Mk3 unit)		1.5kg
Size (front not included)		179.6 x 158.2 x 51.6 mm (W x D x H)
Over-voltage protected inputs		Not applicable for CC-Mk3 BMW computer

## **Signal description**

### **Blue MQS Connector (X1)**

X1-1	Battery+	(KL30) +12V permanent.
X1-2	Not connected	
X1-3	I/K bus	BMW communication bus (I/O bus; positive edges are used to switch on the CC-Mk3 (CSI-ON signal)
X1-4	RED75 *)	Red output line of RGB analogue video at 75Ω interface
X1-5	GREEN50 +SYNC	Green with sync output line of RGB analogue video at 50Ω interface
X1-6	BLUE50	Blue output line of RGB analogue video at 50Ω interface
X1-7	RED50	Red output line of RGB analogue video at 50Ω interface

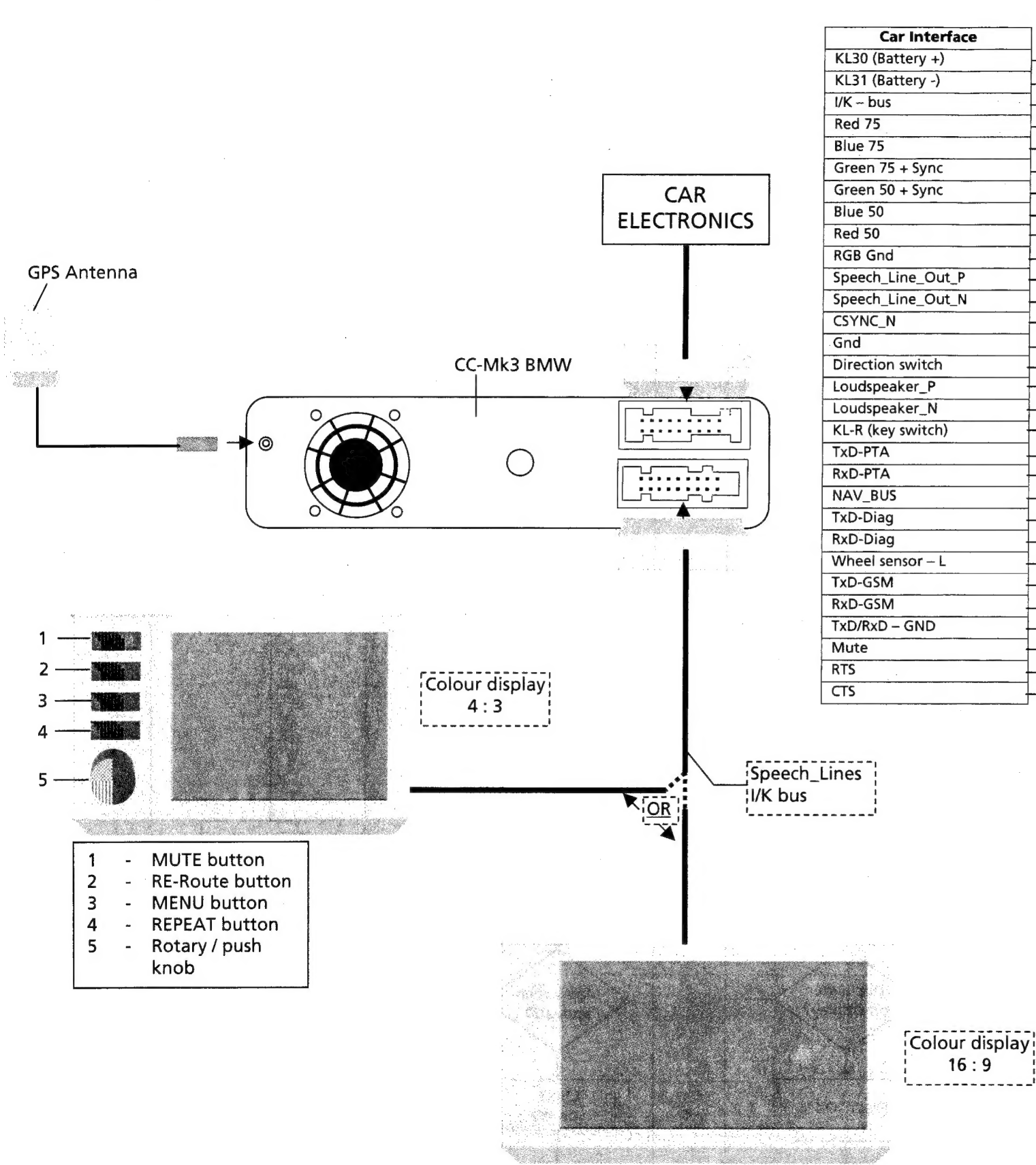
X1-8	GREEN75 +SYNC *)	Green with sync output line of RGB analogue video at 75Ω interface
X1-9	SPEECH_LINE_OUT_P	Audio line out positive
X1-10	GND (KL31)	Battery ground
X1-11	Not connected	
X1-12	GND	
X1-13	BLUE75 *)	Blue output line of RGB analogue video at 75Ω interface
X1-14	GND	
X1-15	RGB GND	
X1-16	GND	
X1-17	CSYNC_N	Composite sync output (TTL level) – active low – load $\geq 1k\Omega$
X1-18	SPEECH_LINE_OUT_N	Audio line out negative

\*) The 75Ω RGB output is derived by adding a resistor to the 50Ω interface at the connector block; Only one of the interfaces (either 50Ω or 75Ω) may be used!

#### Violet (-/23) or White (-/235) MQS Connector (X2)

X2-1	Direction switch	Detects whether vehicle moves either forward or backward
X2-2	Loudspeaker_N	Negative loudspeaker output; max. output 22W at 4Ω (between X2-2 and X2-4)
X2-3	Keyswitch	(KL-R) +12V switched (12V=keyswitch ON / 0V=keyswitch OFF)
X2-4	Loudspeaker_P	Positive loudspeaker output
X2-5	TxD-PTA	Transmitted data (RS-232C output) via CSI board – <i>Remark: to be defined yet</i>
X2-6	RxD-PTA	Received data (RS-232C input) via CSI board – <i>Remark: to be defined yet</i>
X2-7	NAV-BUS	I/O communication to the display unit; the bus is based on the I <sub>bus</sub> concept
X2-8	TxD-DIAG	Transmitted data (output) via RS-232C interface
X2-9	RxD-DIAG	Received data (input) via RS-232C interface
X2-10	Wheel-sensor-L	Input of wheel sensor left signal from ABS (Anti-Block-System) computer
X2-11	Not connected	
X2-12	TxD-GSM	Transmitted data (output) via CSI board – for GSM purposes – <i>Remark: to be defined yet</i>
X2-13	(B)MUTE_N	Mute output to radio set; active low, passive high (floating); $R_{load} > 10k\Omega$
X2-14	RS232C-GND	RS232C serial interface ground.
X2-15	GND	
X2-16	RxD-GSM	Received data (input) via CSI board – for GSM purposes – <i>Remark: to be defined yet</i>
X2-17	RTS	Ready-To-Send output (CSI board)
X2-18	CTS	Clear-To-Send input (CSI board)

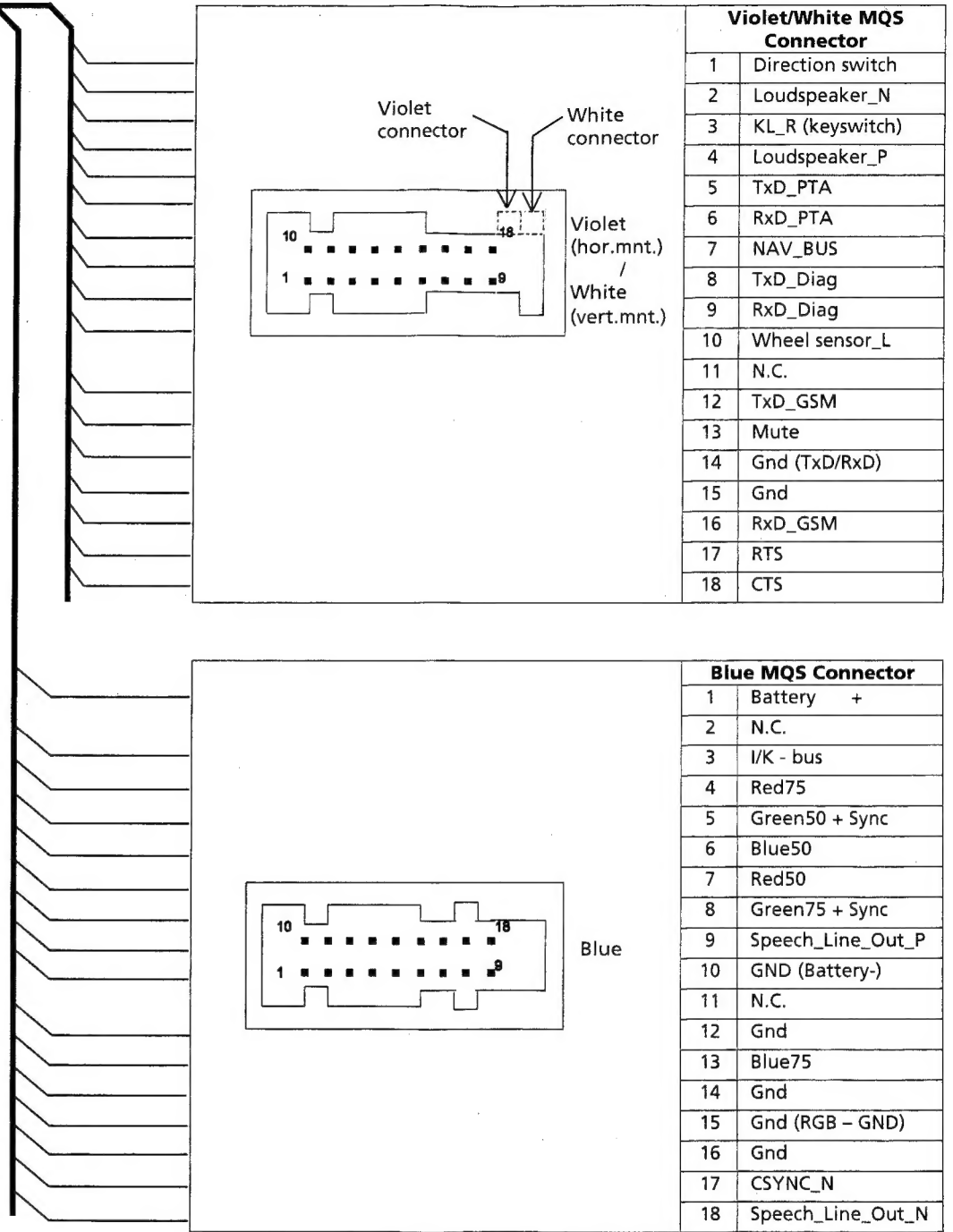
Navigation system



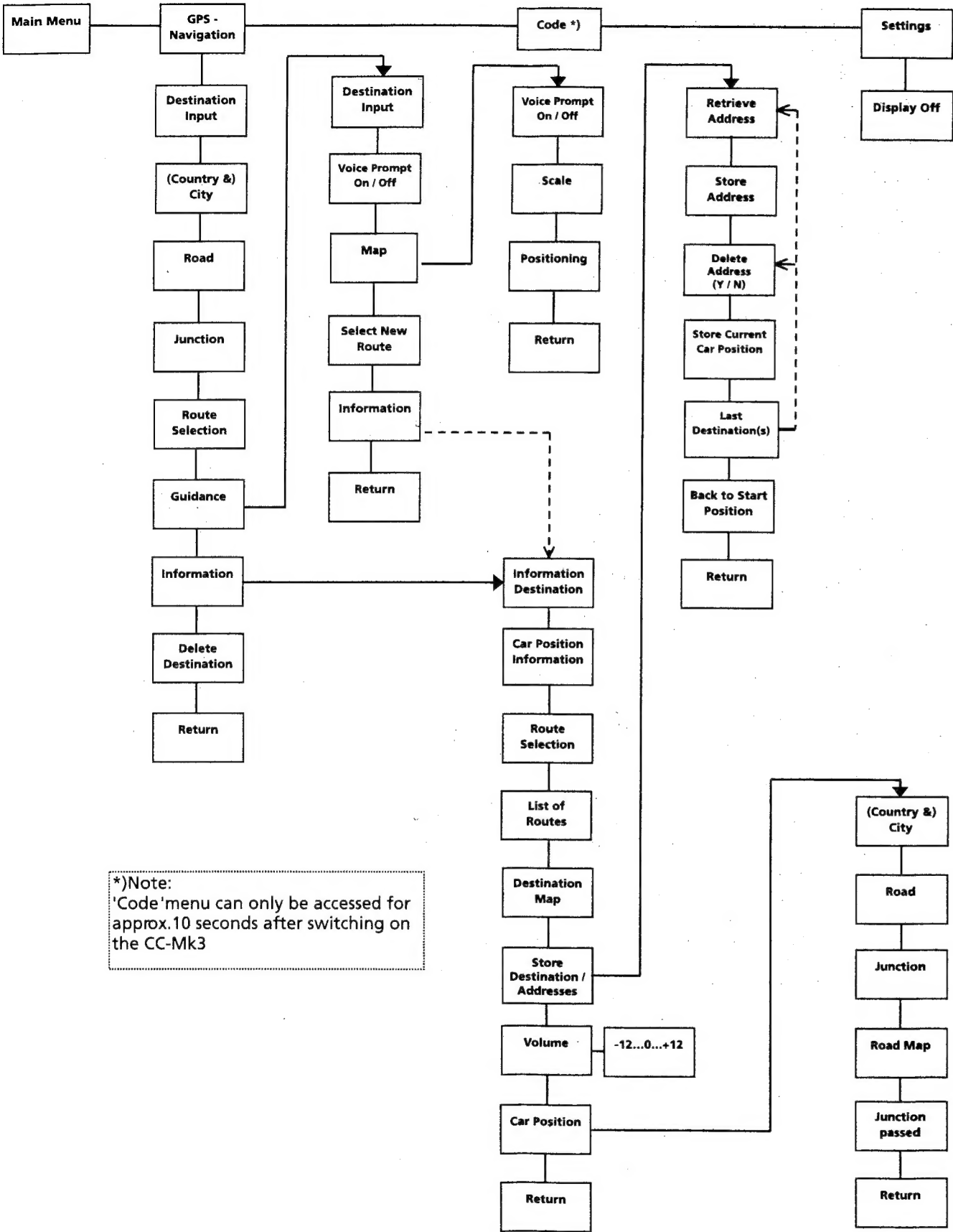
Cabling

Car Interface	
KL30 (Battery +)	
KL31 (Battery -)	
I/K - bus	
Red 75	
Blue 75	
Green 75 + Sync	
Green 50 + Sync	
Blue 50	
Red 50	
RGB Gnd	
Speech_Line_Out_P	
Speech_Line_Out_N	
CSYNC_N	
Gnd	
Direction switch	
Loudspeaker_P	
Loudspeaker_N	
KL-R (key switch)	
TxD-PTA	
RxD-PTA	
NAV_BUS	
TxD-Diag	
RxD-Diag	
Wheel sensor - L	
TxD-GSM	
RxD-GSM	
TxD/RxD - GND	
Mute	
RTS	
CTS	

CC-Mk3 BMW Navigation computer



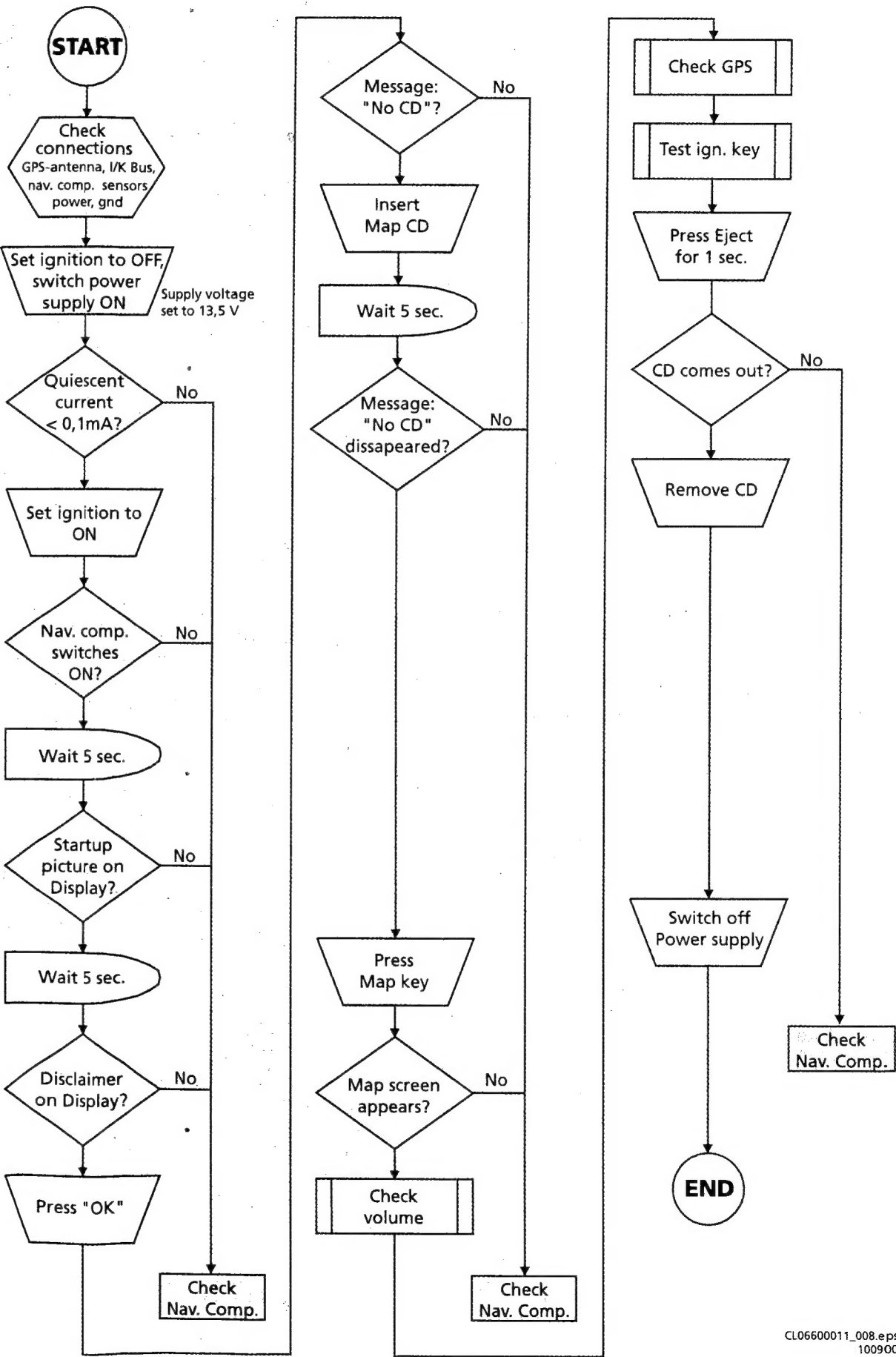
Menu survey



\*)Note:  
'Code'menu can only be accessed for approx.10 seconds after switching on the CC-Mk3

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110900

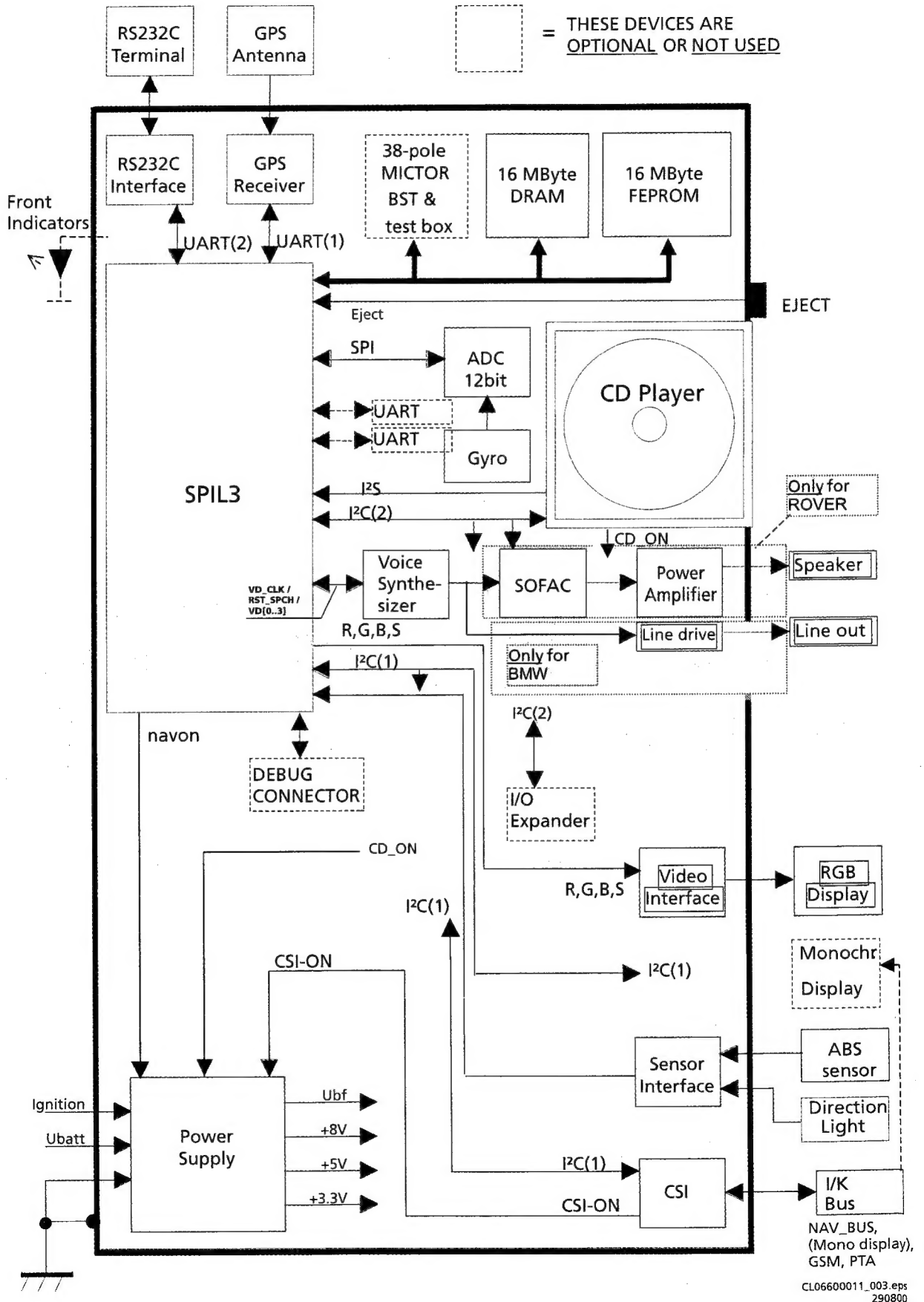
System test - Flow chart



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100900

# Navigation computer 22SY591/23/23S

## Block diagram



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## **Block diagram description**

### **SPIL3A**

The SPIL3A is an „ASIC“; that is the core of the CC-Mk3 navigation computer. It has the following main functions:

- CPU
- RAM, FEPRM and BUS controller
- External bus interface EBIF
- CD, I<sup>2</sup>C (2x), I<sup>2</sup>S and Interrupt Request Controller
- Colour Graphics display controller
- Video DAC (not used here)
- CD data retrieval controller
- Voice synthesizer interface
- Serial communication interfaces (4 UART's and Serial Peripheral Interface controller)
- Clock and Reset signals generator
- Timers and Compare units
- General I/O (16x)
- RC5- and BST interface (not used here)
- Address protection unit

The CPU inside the SPIL3A is running on 54MHz and has 4kByte instruction cache, 1kByte data cache, 8kByte internal SRAM, multiply accumulate unit and an „on-chip“ debug support. This CPU has a non-multiplexed 32 bit data and address bus which is used in the asynchronous mode.

The clock frequency (54MHz) is derived from a 6.75MHz oscillator.

The main tasks of the processor are:

- Dead reckoning
- Map matching
- Route planning
- Route guiding
- Voice output
- Display processing
- Map database handling
- Diagnostic
- User Interface
- Communication via I<sup>2</sup>C, I<sup>2</sup>S and I/K - busses.

### **FEPRM**

The size of the instruction memory is 16MByte. It has a 32 bit data bus and is controlled by the SPIL3A.

All sectors of the FEPRM can be locked (disabled for erasing and writing) under software control.

Additionally, there is a general write protection pin, which is also controlled by software.

At (power-on) reset the CPU starts from the FEPRM to boot up. The sector dedicated to the boot SW in the FEPRMs is programmed with the application software from CD. A so-called 'SW loading flag' is set when the application s/w must be loaded and this flag is reset by this s/w after it is loaded properly into FEPRMs.

Note: the TEST software uses the DRAM instead of the FEPRMs.

FEPRMs are also used for non-volatile data storage. The non-volatile storage is intended for the following data:

- Application (calibration, last car position, address book, etc.)
- Identification
- HW test bytes
- Statistical data (a.o. time of operation)
- Error logging
- Customer specific data
- VDO / Philips ID block
- Software loading block
- Voice data.

### **DRAM**

The size is 16MByte. The data memory has a 32 bit data bus and is controlled by the SPIL3A.

It is used for the user specific data and for loading the TEST software from CD.



## Voice synthesizer

The voice synthesizer is based on the MSM6585. The chip is used in 4bit ADPCM mode. Sample frequency is 16kHz; bandwidth is 6,800Hz. The output of the synthesizer chip is filtered and fed to a SOFAC.

The voice data normally is stored in FEPRAM, but DRAM too can be used as voice data file. The voice synthesizer control, to transfer data from the voice data file to the voice synthesizer, is part of the SPIL3A.

## SOFAC, Audio line driver and power amplifier

The SOFAC is based on the TDA7342. The SOFAC control bus is the I<sup>2</sup>C(2) bus of the SPIL3A. Input channel 1 consists of the CDA-R and CDA-L outputs. Channel M is the filtered voice output VOI-SIG.

With the SOFAC a modification of the volume, bass and treble of the audio signal delivered by the voice synthesizer can be done.

The output left front of the SOFAC is fed to a power amplifier stage (TDA7375) (used for BMW-Rover) and with an attenuation of -24dB it is fed to a TDA7052 line driver (used esp. for BMW) as the "voice line out" signal. The "voice line out" signal (Speech\_Line\_Out\_P / N esp. for BMW) is used to control the audio circuit in the display unit.

At 0dB the amplifier is able to deliver a maximum of 22W with a load of 4Ω and 3V<sub>eff</sub> on the "voice line output". The outputs "left rear" and "right rear" are fed to line drivers as the "line out left" and "line out right" signals (Speech\_Line\_Out\_P / N for (BMW-)Rover). The output levels are 1V<sub>eff</sub> at 0dB.

The output of the power amplifier is connected to a loudspeaker inside the car.

## Gyro

The gyro is an angular rate sensor. The dynamic range is -80 °/sec to +80 °/sec. The bandwidth is 7Hz.

The gyro is supplied with a +5Vgyro, derived from the +Ubfs (filtered and switched car battery voltage).

Electrical specs.:

Symbol	Parameter	Min.	Typ.	Max	Unit
Vcc	Supply voltage	4.75	5.0	5.25	V
Icc	Supply current @Vcc=5V	8		14	mA
Vol	Output voltage low			0.5	V
Voh	Output voltage high (Vcc-0.15V)	4.6	4.85		V
	Zero point output	2.1	2.5	2.9	V
	Temperature range	-30		+80	°C
	Sensitivity		25		mV/deg/sec
	Temperature drift (-30...+80°C)	-50		+50	mV/7.5°C
	Noise			10	mVpp

## Gyro interface / ADC

For sufficient navigation accuracy, the gyro signal has to be converted to 12bit digital data.

The gyro output signal is filtered with a low pass filter and is converted from analog to digital data via a 12bit ADC. The supply and the reference voltage of this ADC are connected to +5Vgyro for minimum ADC conversion errors. The ADC is controlled and read by the SPIL3A via a SPI – bus. An extra multiplexer is used to increase the number of channels from 8 to 16. The other channels of the ADC are used for diagnose purposes:

- Temperature (sensor on main board, used for temperature dependent fan control).
- +U<sub>batt</sub>
- Reference voltage (1.25V)
- Internal supply voltages of the mainboard (+3.3V<sub>nav</sub>, +5V<sub>nav</sub>, +8V, +5V<sub>v</sub> and +5V<sub>rc</sub>)
- Several audio diagnosis stages
- Display driver (RGB and CSYNC outputs)
- Fan current
- Voice line out
- CSYNC buffered output

## GPS receiver

The GPS receiver is supplied with 5V and a backup supply (3.2V...5.25V, 2µA typ.) to supply the SRAM. Nominal data rate is 9600 baud. Communication is established via an UART channel.

Cold start: the typical time to first fix (initial position) is less than two minutes. To build up a complete almanac, the receiver will need 15 minutes.

Warm start (power down for more than 60 minutes): time to first fix is less than 45 seconds.

Hot start (power down for less than 60 minutes): time to first fix is less than 20 seconds.

GPS connector, 8pin micromatch, pos. 1004:

NC	1	2	+5V <sub>nav,us</sub>
RXD1	3	4	+V <sub>bup</sub>
TXD1	5	6	1PPS
NC	7	8	Gnd

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280800

## Sensor input interface

The interface between the input signals (ABS sensor and direction light (reverse gear)) and the SPIL3A is called "sensor input circuit". It contains hardware for filtering, amplification and level shifting.

Connectable are „open collector“ circuits or other active switches and inductive sensors.

The 'Direction Light' input works with rectangular „active high“ signals with the following electrical specifications:

Symbol	Parameter	Min.	Typ.	Max	Unit
$V_{T-}$	Negative going threshold light / acc input	3.2	3.3	3.4	V
$V_{T+}$	Positive going threshold light / acc input	3.9	4.1	4.3	V
$V_{T-}$	Negative going threshold direction input	3.2	3.3	3.4	V
$V_{T+}$	Positive going threshold direction input	3.7	3.8	3.9	V
$I_L$	Input current low @ $U_i = 0V$		0.001	0.01	mA
$I_H$	Input current high @ $U_i = 16V$		0.75		mA
$C_{in}$	Input capacitance @1MHz		4700		pF
$t_w$	Pulse width	2			msec
$U_i$	Absolute max, during 60 sec.	-100		+75	V
$I_i$	Absolute max, during 60 sec.	-0.05		+3	mA

The ABS sensor input is adapted to the customer requirement by a special interface which is placed inside the head unit. The output of this interface leads to the standard circuitry on the main board. The ABS sensor input can work with rectangular signals with high levels of above 3.3V.

Electrical specifications of „ABS sensor“ signals:

Symbol	Parameter	Min.	Typ.	Max	Unit
$V_T$	Input threshold voltage (p-to-p / 10Hz)	250	300	380	mV
$V_T$	Input threshold voltage (bypass)	1.7		3.3	V
$C_{in}$	Input capacitance @1MHz	900	1000	1100	pF
$I_L$	Input current low @ $U_i = 0V$		0.9	1.1	mA
$I_H$	Input current high @ $U_i = U_{bat}$		0.001	0.01	mA
F	Frequency range			3	kHz
	Duty cycle range	1		99	%
$U_i$	Absolute max, during 60 sec.	-60		+110	V
$I_i$	Absolute max, during 60 sec.	-3		+0.05	mA

## CD player / unit

The CD player is derived from the CD player audio module and adapted for double speed and a buffered I<sup>2</sup>S bus, available on the CD player connector. The CD module used in the BMW CC-Mk3 22SY591/23 is the CDM-M2/2.3 version for horizontal mounting, whereas the 22SY591/23S uses the CDM-M2/8.3 module. Refer to the CDM-M2/2.3 and –8.3 Service – and Supplement manuals for more information of this CD modules.

Interface between CD player and main board:

- I<sup>2</sup>C(2) control bus
- I<sup>2</sup>S data bus (WSIN, DAIN, CLIN, EFIN)
- Supply (+5V, +12V, GND)
- Reset
- CRQ for an I<sup>2</sup>C communication request (active low)
- INS\_SW to switch on the CC-Mk3 in case a CD will be inserted (active low).

The specified CD player operating temperature range is -20°C / +70°C.

The CD player is a double speed CD-drive with an access time of ~ 500 ms typical, 1.5 sec maximum.

The CD player can also run in single speed. The current implementation of CD player only supports single session discs.

CD player connector, 14pin micromatch, pos. 1002:

EFIN	1	2	WSIN
DAIN	3	4	GND
CLIN	5	6	GND
RST_CD	7	8	+5V <sub>navus</sub>
CD_INT	9	10	SDA2
SCL2	11	12	+Ubf
GND	13	14	INS_SW

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## CD control interface

The CD player control bus is I<sup>2</sup>C. It has an additional 3rd line, CRQ (Communication ReQuest, CD\_INT named in the connector diagram). The CD player is always slave.

The CRQ line is set low to signal the SPIL3A that information is available.

The CD player reset input is controlled via an general purpose output of the SPIL3A.

## CD data interface

The data interface on the CD player uses the Philips I<sup>2</sup>S format.

It consists of 4 output signals from the EFM decoder:

- WSIN = Word Select
- DAIN = Data
- CLIN = Data Clock
- EFIN = Error Flag.

The data interface from CD player (I<sup>2</sup>S bus) to host memory (DRAM) is fully covered by the SPIL3A.

## Power supply

The power supply generates and stabilizes the supply voltages for the navigation computer.

It is supplied from the car battery and is switched on either the ignition signal or via the I/K bus signal („CSI-ON“) from the CSI board. Switching on by the 'Eject' button or by inserting a CD is provided as well.

The switching off can be delayed by the SPIL3A. The unit is switched off after a software controllable time when the ignition signal is off and if there is no I/K bus activity („CSI-ON“ is low).

The main functions of the supply unit are:

- Supply of all digital and analogue circuitries on the mainboard, gyro, GPS receiver and CD player
- Detection of power failure on the +3.3V supply for the host computer and +5V
- Power-on / -off control
- Supply of a cooling fan

#### Specification:

- Switch mode power supply, down converter.  
Input voltage range is 6V to 16V. If the supply voltage from the battery is 9 - 16V, the navigation computer is in normal operation. Between 6 - 9V the computer has no power failure, but is partly operational (supply voltage too low to drive the disc motor and other motors properly).  
Efficiency 85% at 12V input voltage, 70% at 5,5V input voltage.  
Two SMPS generate 5V and 3.3V. Maximum load is 1A per supply.  
+5V series low drop regulator for the Gyro.
- Power-on/-off switch by means of a high side switch.  
The minimum battery voltage to be able to switch on the navigation computer supply is +6.0V.  
A high level,  $U_i > 3.3V$ , on the ignition – or CSI input will switch on the high side switch. The high side switch can also be switched on via the 'Eject' button to allow CD exchange when the button is pushed again. The power is also switched on in case a CD is inserted.  
When the ignition – or CSI signal is low, the power can be kept on by the SPIL3A as long as it supplies "power-off delay" pulses to the power supply.  
The pulse rate must be  $\geq 30$  Hz. The minimum pulse duration is 100 msec. The power supply is switched off when the ignition signal is low, the "power-off delay" pulses are stopped and if there is no I/K bus activity. The CC-Mk3 can be switched on via positive edges at the I/K-bus signals (CSI-ON is active).
- Quiescent current (power switched off) is  $<100\mu A$  typ.
- Typical supply currents:
  - Gyro: +5V / 20mA (from +Ubfs)
  - CD player: +5V / 200 mA (during play)  
+Ubfs / 100mA ( $I_p = 1A$ )
  - NAV: +3.3V / 350mA  
+5V / 300 mA (digital circuits)  
+8.0V / 30mA (analogue circuits)
  - CSI board: +5.0V / 150mA
  - GPS w/ant.: +5.0V / 120mA typ.
  - Fan: +Ubfs / 70mA
- Power failure threshold voltage  
Power failure threshold voltage = 3.0V for +3.3V supply.  
Power failure threshold voltage = 4.7V for the +5V supply.  
Both the +5V and the +3.3V supply must be above the threshold voltage before the PWFN signal is released (high) with an extra delay time of 6msec. If one of the voltages goes below the threshold voltage, the PWFN signal is activated (low) again. The host reset signal (RST\_HOSTN) is an active low output signal from the SPIL3A. The signal is low when PWFN is low and is set high when the program execution starts. The output RST\_HOSTN is set or reset under software control.

#### **Eject**

The 'Eject' button is connected to a general purpose I/O of the SPIL3A. The SPIL3A controls the CD player loader functions, including eject. When the CC-Mk3 power is off, the eject button switches on the power. When the button is pushed again, the CD is ejected by SPIL3A control. The power is switched off after power-down delay time, when the ignition signal is off, when there is no I/K bus activity and when the eject button is released.

#### **Cooling**

Application of a forced cooling by floating air is necessary. For this a cooling fan on the rear bracket is applied, mounted with 4 fan strings. For low fan temperature and controlled airflow the fan is at the air intake side.

The air outlets are in the top cover. To protect the CD player laser and CD-disc against dust, the CD player unit is shielded from the air flow by a dust shield. A dust shutter will cover the CD slot.

The fan is controlled by software. Below a temperature of +55°C (internal temp. sensor), the fan will be switched off. Above +60°C it will be switched on. The range in between is intended for on/off switching hysteresis. In case of overheating (sensor temperature is higher than +80°C), the module is put in a state, where dissipation is decreased to a minimum and the CD player is stopped and not accessed.

It is not possible to switch off the computer under software control while the ignition signal is present.

### **Colour display interface**

The RGB display interface is used to drive a load of 50Ω (for each of the R, G and B signals). With help of software, it is configured to deliver a negative CSYNC-in-Green signal. The output level of the drivers is 0.7V<sub>pp</sub> typ. @ 50Ω.

The 75Ω RGB output is derived by adding a resistor to the 50Ω interface at the connector block; Only one of the interfaces (either 50Ω or 75Ω) may be used.

### **Monochrome display interface**

The monochrome display interface is controlled via the NAV-BUS. This bus is an I/O bus, based on the I/K – bus.

### **RS232 interface**

The UART2 of the SPIL3A represent an interface which is according to the RS232C standard. The adaptation of the signal line RxD and TxD is done by a RS232 transceiver LT1181.

### **RC5 (remote control) interface**

This device is not used here. Via the internal I<sup>2</sup>C interface, the CSI / CSB (Customer Specific Interface / Board) and the I/K-bus, the CC-Mk3 is controlled by the car controls.

### **CSI / CSB (Customer Specific Interface / Board)**

The Customer Specific Interface board forms an interface between the I/K-bus and the CC-Mk3 computer. In general, the CSI board is used for the following functions:

- NAV-BUS, to control a monochrome display
- I/K bus interface
- PTA (Personal Travel Assistant) RS-232C interface
- DFÜ (Daten Fern Übertragung) RS-232C interface

The I<sup>2</sup>C(1) bus is used for control – and data transfer to and from the CSI board. This board is connected via a 30-pole male connector to the main pcb. See elsewhere in this manual for the connector layout.

### **Optional Test connectors**

There are optional connectors on the main pcb, to connect additional measuring equipment. Here a more detailed description follows:

- I/O expander
- DEBUG connector: to connect the 'debug' bus of the SPIL3A (1x20-pole); is used only for servicing purposes. Via this connector the SPIL3A registers can be accessed directly.
- MICTOR connector: via this connector a test box can be connected to the computer to execute a BST (Boundary Scan Test) (38-pole)
- Data logger connection to the 'GPS communication and Odometer Output' (6-pole Micromatch)
- Data logger connection to the SPI for GYRO data (6-pole Micromatch)

## Devices not used in BMW CC-Mk3

The following devices are not used:

- MPEG1 / Video memory
- YUV > RGB converter and multiplexer
- Audio DAC
- D<sup>2</sup>B electrical and optical bus
- RC5 interface for remote control

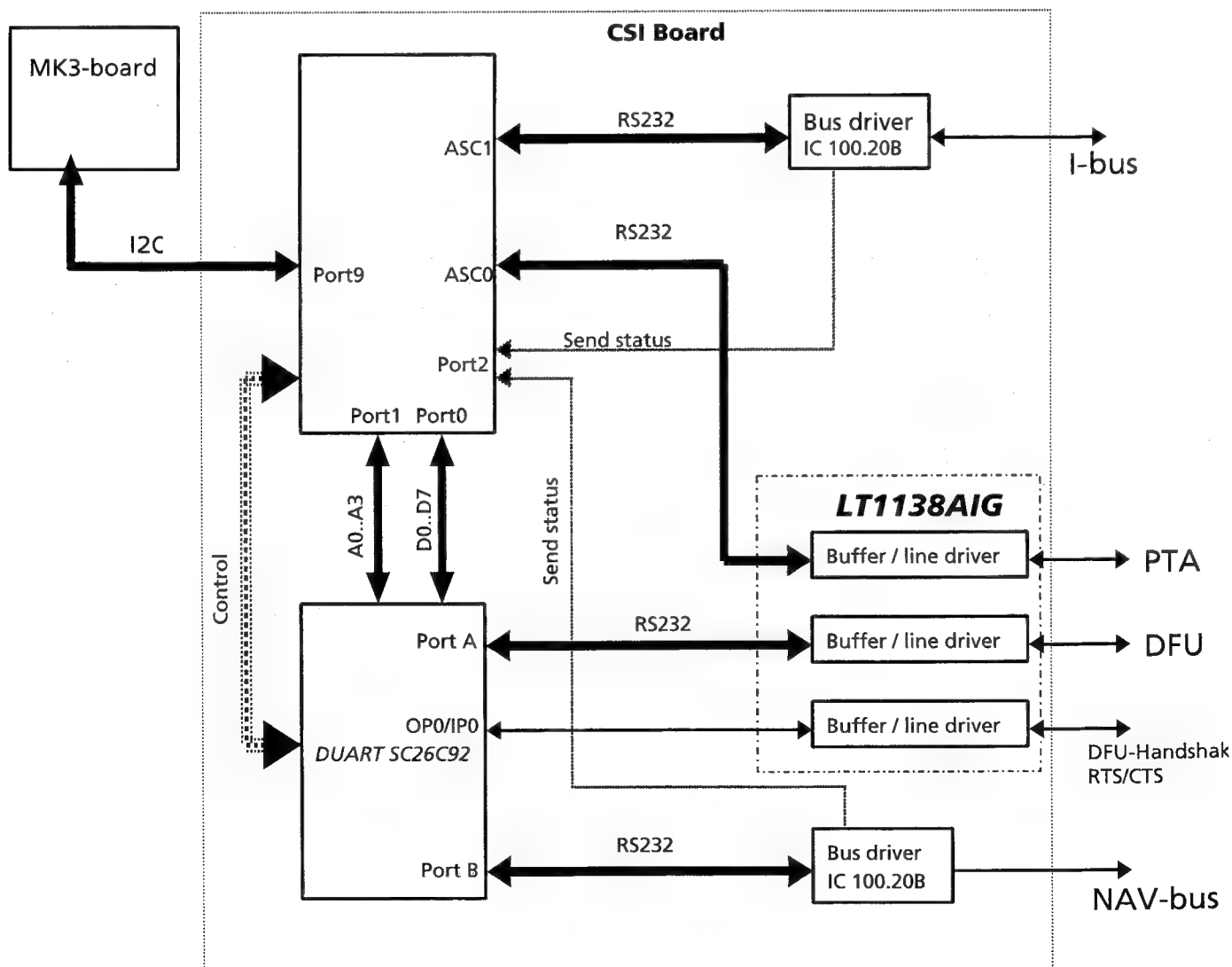
## Indications

The CC-Mk3 front contains the following indications:

- Eject button is illuminated, when the power is switched on.

## Customer Specific Board (CSB)

### CSB architecture



CL06600011\_006.eps  
100900

## **External interconnections**

Refer to the section 'Cabling' in this manual for all external interconnections.

### **CSB connector**

Pin	CSB Signal	Description / Value
1	GND	0V
2	TxD-GSM	RS-232C transmit - GSM purposes
3	RxD-GSM	RS-232C receive - GSM purposes
4	GND	0V
5	RTS-GSM	Ready to Send (RS-232C) - GSM purposes
6	CTS-GSM	Clear to Send (RS-232C) - GSM purposes
7	+5V	Supply for CSI board
8	SCL	5VDC (SPIL3A)
9	SDA	5VDC (SPIL3A)
10	GND	0V
11	RST_HOSTN	3.3VDC input from navigation
12	CSB_INT	3.3VDC output to interrupt navigation
13	CSI_ON	5VDC output to signal 'ON' for CC-Mk3
14	TxD-PTA	RS-232C transmit - via PTA
15	RxD-PTA	RS-232C receive - via PTA
16	N.C.	N.C.
17	N.C.	N.C.
18	GND	0V
19	N.C.	N.C.
20	N.C.	N.C.
21	N.C.	N.C.
22	N.C.	N.C.
23	N.C.	N.C.
24	+U <sub>bfs</sub>	Supply voltage for CSI board
25	N.C.	N.C.
26	N.C.	N.C.
27	GND	0V
28	I/K-BUS	I/O signal for I/K bus
29	NAV-BUS	I/O signal for NAV-bus (monochrome display)
30	N.C.	N.C.

## Identification block description

### 1. Philips ID block

CARIN computer type	:	Mk3
Hardware ID	:	0103
Active Levels	:	80

### 2. Customer ID block

Validity Check	:	Byte 0 = 1
Customer ID for customer identification block	:	Byte 1 = 0
Required country setting (Europe / USA)	:	Byte 2 = 0
Required unit system (Metric / Anglo / American)	:	Byte 3 = 0
Required date format (Europe / USA)	:	Byte 4 = 2
Required time format (24h / 12h(AM/PM))	:	Byte 5 = 1
Required GALA mode (off / 1...4)	:	Byte 6 = 1
Required hand brake mode (on / off)	:	Byte 7 = 0
Required speed limit configuration (Europe / USA)	:	Byte 8 = 0
Monitor (display) format (4:3 / 16:9)	:	Byte 9 = 1
Enable security module	:	Byte 10 = 1

### 3. Software loading block

Customer ID for software loading	:	BMWC01S (colour) / BMW01S (monochr.)
First language	:	d_f.csf
Second language	:	gb_f.csf

## I/O Addresses

The following I/O addresses are reserved for the CC-Mk3 hardware devices:

Device	I <sup>2</sup> C Bus	I/O address (hex)
CSI board	I <sup>2</sup> C (1)	54
CD player control port	I <sup>2</sup> C (2)	30
SPIL3A	I <sup>2</sup> C (1)	60
SPIL3A	I <sup>2</sup> C (2)	62
SOFAC control port	I <sup>2</sup> C (2)	88

With help of the 'Free Access' command **00000040** (refer to Test Software Service manual), these addresses can be accessed and modified directly.



## Checks

### 1. Introduction

This section describes the checks to be done after repair of the main board and/or peripheral devices.

To have an exact overview and a complete description of the tests / commands mentioned here, refer to the CC-Mk3 TSW Service manual. Figure i shows the TSW test connections, whereas figure ii shows the CC-Mk3 in its total (BMW) measuring environment.

### 2. Preparing 'Burn-In' Loop test

- To start the 'Burn-In' Loop test, connect  $U_{bat}$  to pins 1001-1 (KL-30) and 1000-3 (KL-R), GND to pin 1001-10 (KL-31) and connect all peripherals as shown in the figures.
- The following tests must be programmed into the 'Burn-In' loop:

```

0430000019   TCU
0430000065   IRC1
0430000066   IRC2
0430000069   Timer0
0430000018   Bus error
0430000024   APU
0430000027   DRAM march
0430000030   Mirroring
0420000001   I2C1 bus
0A30000B12000000020201
                CD read, 2x,
                double speed,
                00 for APM
                7112 235 1402
                01 for Carin II
                rel. 1.2 CD
093000B2120000000102
                Access time,
                1x double speed
043000004C   ADC
043000004A   Fan
0420000012   SRAM March
0430000046   Video *
0420000032   Counter *
043000001A   GPIO *
0420001000   Loudspeaker **
0420001001   Audio line driver out ***
* - dummy required
** - only for (BMW-)Rover
*** - only for BMW
- Refer to the CC-Mk3 TSW Service manual to
  know how a 'Burn-In' loop test must be set
  up.
- Enter the 'Burn-In mode Next Time'
  command 0000001601.
```

### 3. Burn-In test (only SSP)

- Insert the CARiN test CD.
- Wait for one hour.
- Press the 'Eject' button of the CC-Mk3 system and remove CD.
- Disconnect  $U_{bat}$  from pin 1000-3 (KL-R) to switch off all devices.
- Keep the other power connections intact.

### 4. Complete CC-Mk3 system tests

The tests are subdivided into:

- Get 'Burn-In' results.
- Power supply test.
- Front tests.
- CD tests.
- Interactive 'voice' test.
- GPS test.
- Fan test.

All these tests are described into more detail hereafter.

### 5. Get 'Burn-In' results

- Connect  $U_{bat}$  to pin 1000-3 (KL-R).
- Use TSW command **00000015**.
- Check if no error is shown at the monitor.

### 6. Power supply test

- Connect  $U_{bat}$  to pin 1000-3 (KL-R).
- Use the ADC test command **3000004C**.
- Check if no error is shown at the monitor.

### 7. Front tests

- Connect  $U_{bat}$  to pin 1000-3 (KL-R).
- Thereafter, check the:
  - Illumination and
  - eject button .
- Check the front illumination.
- Use the TSW 'Eject button' test command **30000072** and press the 'Eject' button within 10 sec.
- Check if no error is shown at the monitor.

### 8. CD tests

- With the CD tests the following items are tested:
  - CD insert
  - play (digital) data
  - CD eject
- Disconnect  $U_{bat}$  from pin 1000-3 (KL-R).
- Insert the CARiN test CD into the slot and check if the CC-Mk3 system is switched on and the CD is loaded.
- Connect  $U_{bat}$  to pin 1000-3 (KL-R).

- Use the TSW 'Dynamic Behaviour' test:  
**30000B12000000020200**  
for APM 7112 235 1402  
OR  
**30000B12000000020201**  
for CARiN II rel.1.2 CD .
- Check if no error is shown at the monitor.
- Use the TSW 'Eject' command **00000007**.
- Check if no error is shown at the monitor and the CD is ejected without problems.
- Connect a headphone between Audio Line Out L / R and GND.
- In the headphone line an external volume regulator must be installed!
- Insert Audio CD SBC429.
- Use the TSW 'Voice' test command **0000000902** to generate a 0dB / 1kHz output signal.
- Check if the sound in the headphone sounds properly.
- Use the TSW 'Stop' command **00000006**.

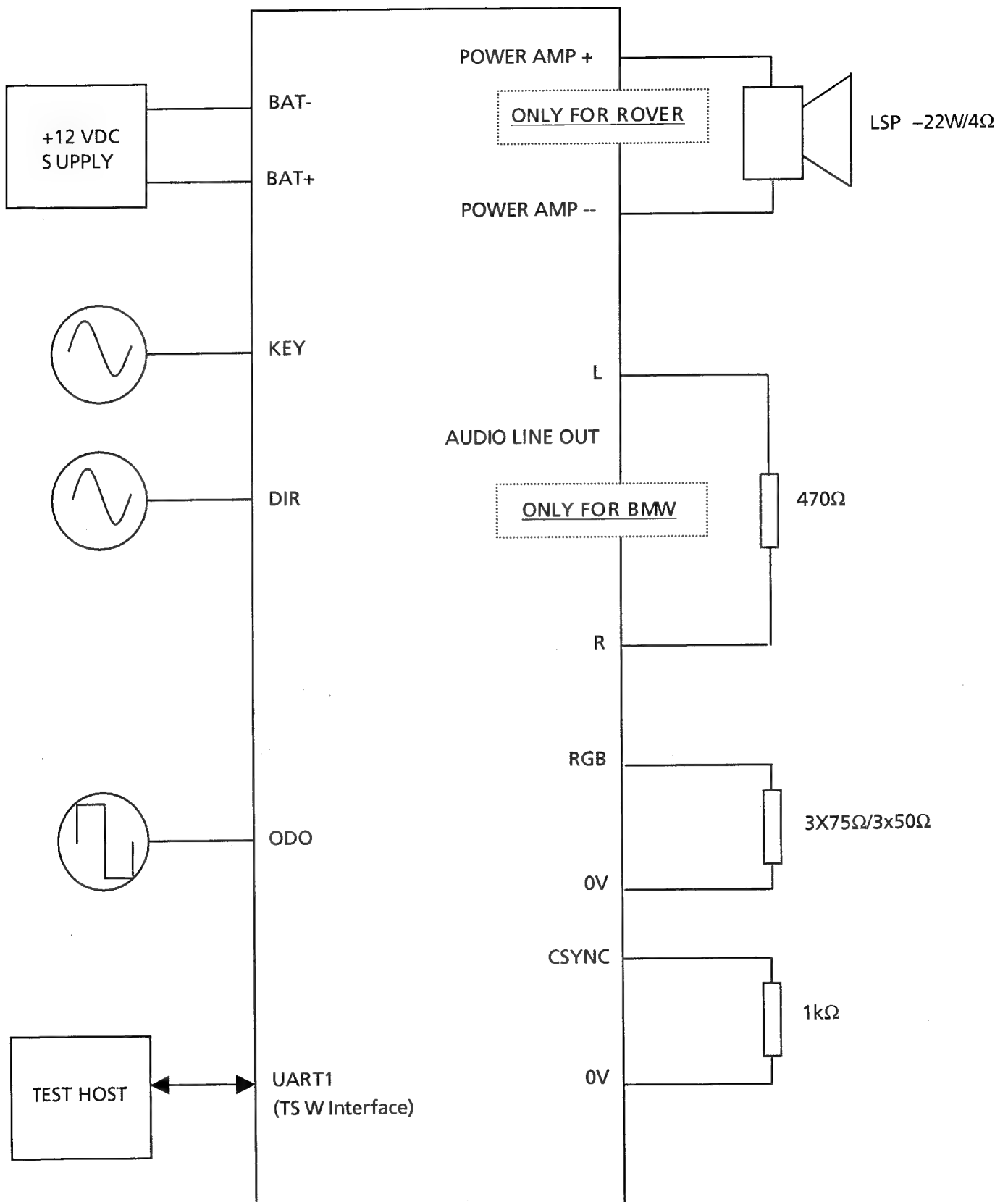
#### 9. GPS test

- Connect  $U_{bat}$  to pin 1000-3 (KL-R).
- Connect antenna to the GPS receiver.
- Use the TSW 'GPS' test command **2000001F**.
- Check if no error is shown at the monitor.
- Use the TSW 'Free Bus Access' command **00000040** to download the almanac from the reference receiver.
- Use the TSW 'GPS' test command **2000001E**.
- Check if no error is shown at the monitor and that the coordinates are shown properly.
- Use the TSW 'Stop' command **00000006**.

#### 10. Fan test

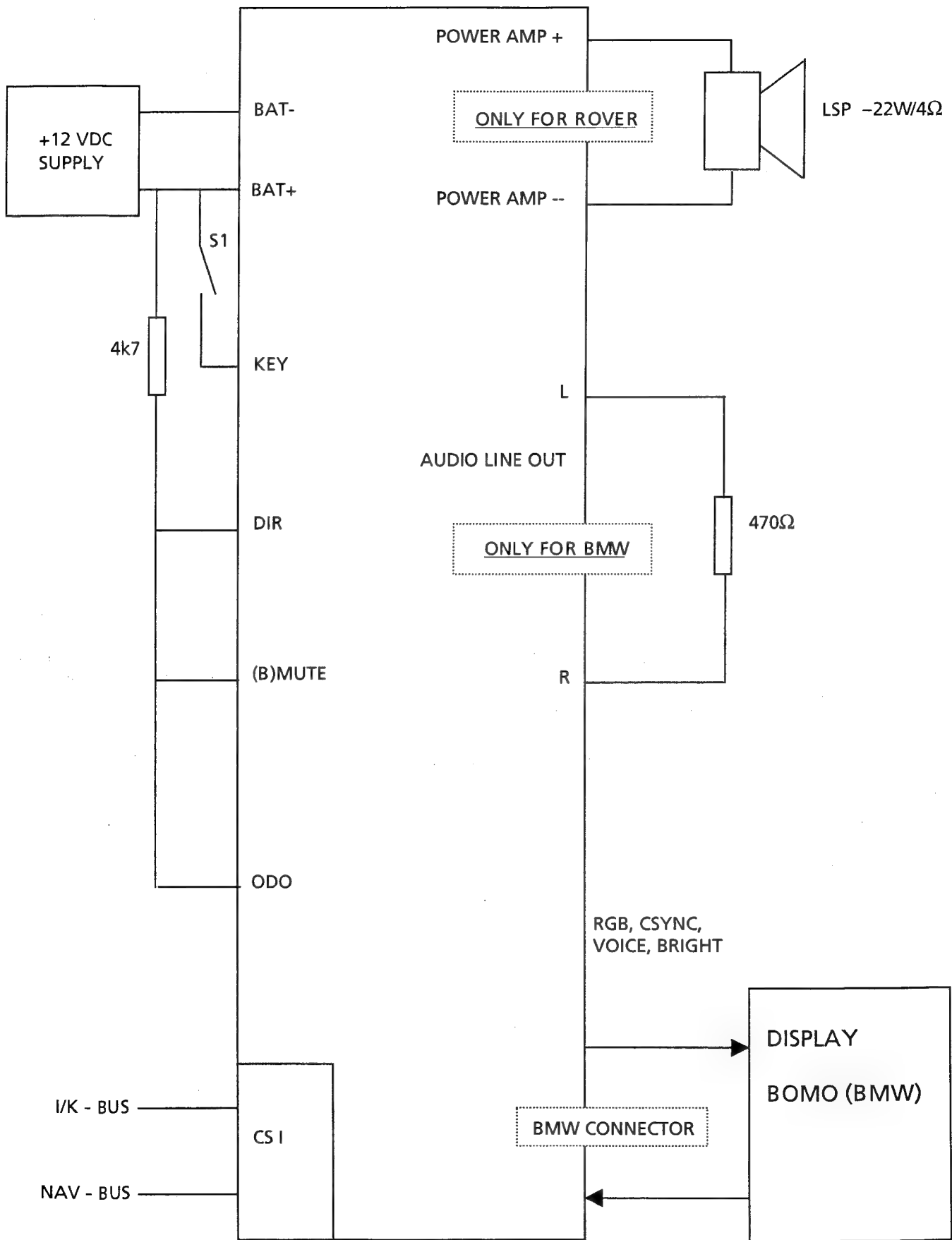
- Connect  $U_{bat}$  to pin 1000-3 (KL-R).
- Use the TSW 'Fan' test command **3000004A**.
- Check if no error is shown at the monitor.

On the following pages figure **i** and **ii** give an overview of all required connections to execute the tests.



CL06600011\_007.eps  
280800

Figure i



CL06600011\_009.eps  
280800

Figure ii

## **Disassembly / Re-Assembly Procedures**

### **1. Important:**

Use ESD protection equipment!

For re-assembling, follow the procedures in the reverse order and read thoroughly all added notes.

Take care that wires, cams etc. are in the right position again after re-assembling.

For the exact position of the parts, refer to the exploded view.

### **2. CDM-M2 module pos.1002**

- Remove the top cover pos.10.
- Remove 4 screws pos.9 (see figure **iii**).
- Lift the module.
- Loosen the 14-pole flat cable from the main pcb connector.
- Take the module out.

Notes:

- When re-assembling, take care that the dust cover is inserted and that it resides between the module and the right rear screw, i.e. NOT between screw and fan! See figure **iv**.
- Fix the screws in the order as shown in figure **iii**.

### **3. Gyro assy pos.1004 (only -/23S version)**

- Remove the CDM-M2 module pos.1002 (see '2.').
- Remove the dust cover pos.8.
- Loosen the gyro flat cable from the main pcb connector.
- Remove the two screws pos.5.
- Take out the gyro assy.

### **4. Front assy pos.1001**

- Remove the CDM-M2 module pos.1002 (see '2.').
- Remove the dust cover pos.8.
- Remove the two screws pos.18.
- Remove the bottom cover pos.11.
- Lift the four brackets of the front at the four corners in such a way that the brackets become free from the chassis.
- Remove the flexfoil from the main pcb connector.
- Take off the front assy.

### **5. GPS receiver assy pos.1003**

- Remove the CDM-M2 module pos.1002 (see '2.').
- Remove the dust cover pos.8.
- Remove the flat cable pos.4 from the connectors on the receiver and main pcb.
- Remove the hex fixation nut and ring from the antenna connector.

- Slide the receiver forward so that the two receiver front holders becomes free from the chassis.

- Take the receiver out upward.

Notes:

- When re-assembling, take care that the two receiver front holders grasp into the fork-shaped spacings of the chassis.
  - When re-inserting the flat cable, take care that the red marked side is at the top position of the receiver connector and at the front position of the main pcb connector!
- Refer to figure **v**.

### **6. Fan assy pos.2**

- Remove the CDM-M2 module pos.1002 (see '2.').
- Remove the dust cover pos.8.
- Disconnect the fan cable from the main pcb connector.
- Cut the four fan strings pos.3 just between the rounded part and the chassis (at the rear) and take out the fan.

Notes:

- When re-assembling the fan, follow this procedure:
- Insert the conical end of the strings at the label side of the fan.
- Pull each string until (after two slight clicks) the big rounded end just rests in the hole of the fan.
- Hold the fan with the cable in top right position.
- Put four new strings through the four holes at the chassis rear simultaneously.
- Pull each of the strings through the holes until one of the smaller rounded parts just goes through the holes (after one slight click).
- Look if the fan is mounted properly and reconnect the fan cable to the main pcb connector.
- Cut off the four conical parts of the strings just behind the rounded parts.

### **7. Main pcb assy pos.1000**

- Remove the CDM-M2 module pos.1002 (see '2.').
- Remove the dust cover pos.8.
- Remove the front assy pos.1001 (see '4.').
- Disconnect the following cables from the main pcb:
  - GPS receiver cable pos.4.
  - Fan assy cable pos.2.

- Unscrew the following screws:
  - Main connector bracket fixation screw pos.16.
  - Two gyro bracket fixation screws.
  - Four main pcb fixation screws pos.6.
  - Take out the main pcb.

**Notes:**

- When re-assembling the main pcb, take care of the following:
  - The EMC protection covers pos.25 must be fitted tightly and properly at their places (no bent lips).
  - The main pcb must rest close to the four fixation points (no play of pcb).
  - The four screws must be fixed in the order as shown in figure **vi**.
  - The connector fixation screws must be tightened properly.

## 8. Figures

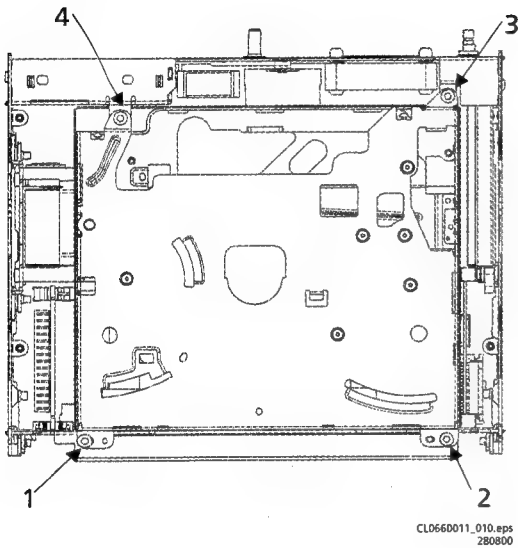


Figure iii

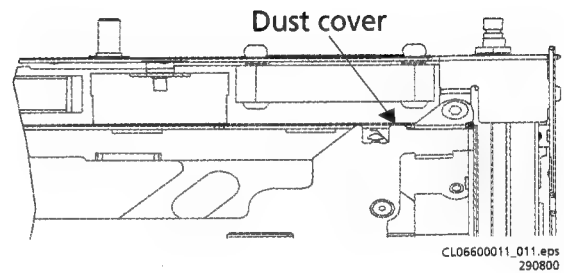


Figure iv

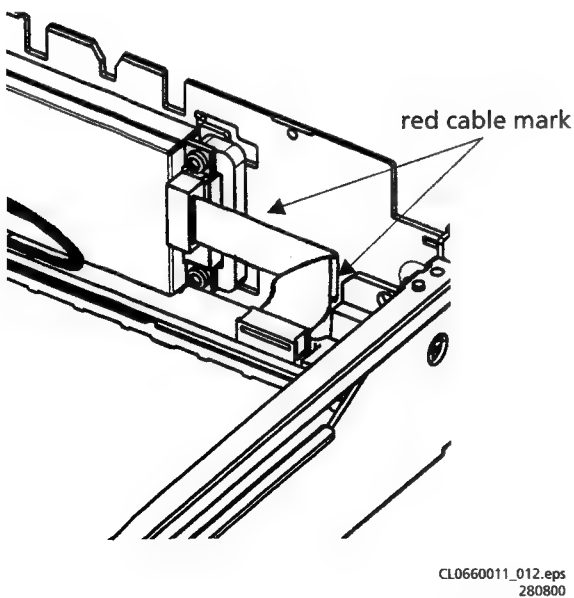


Figure v

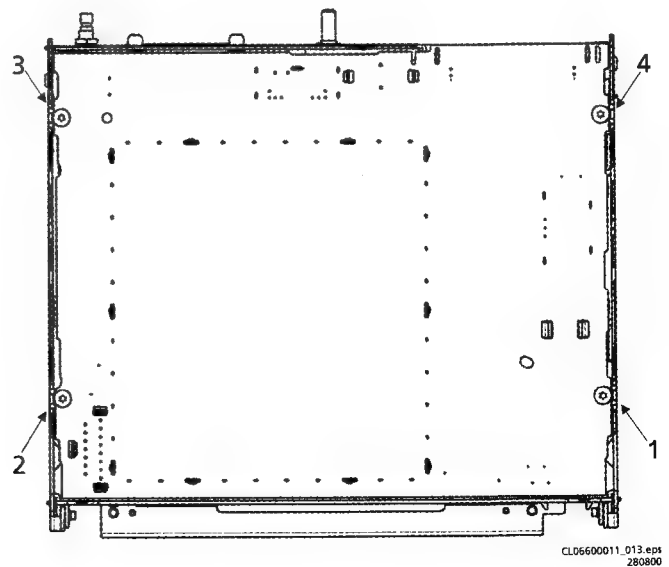
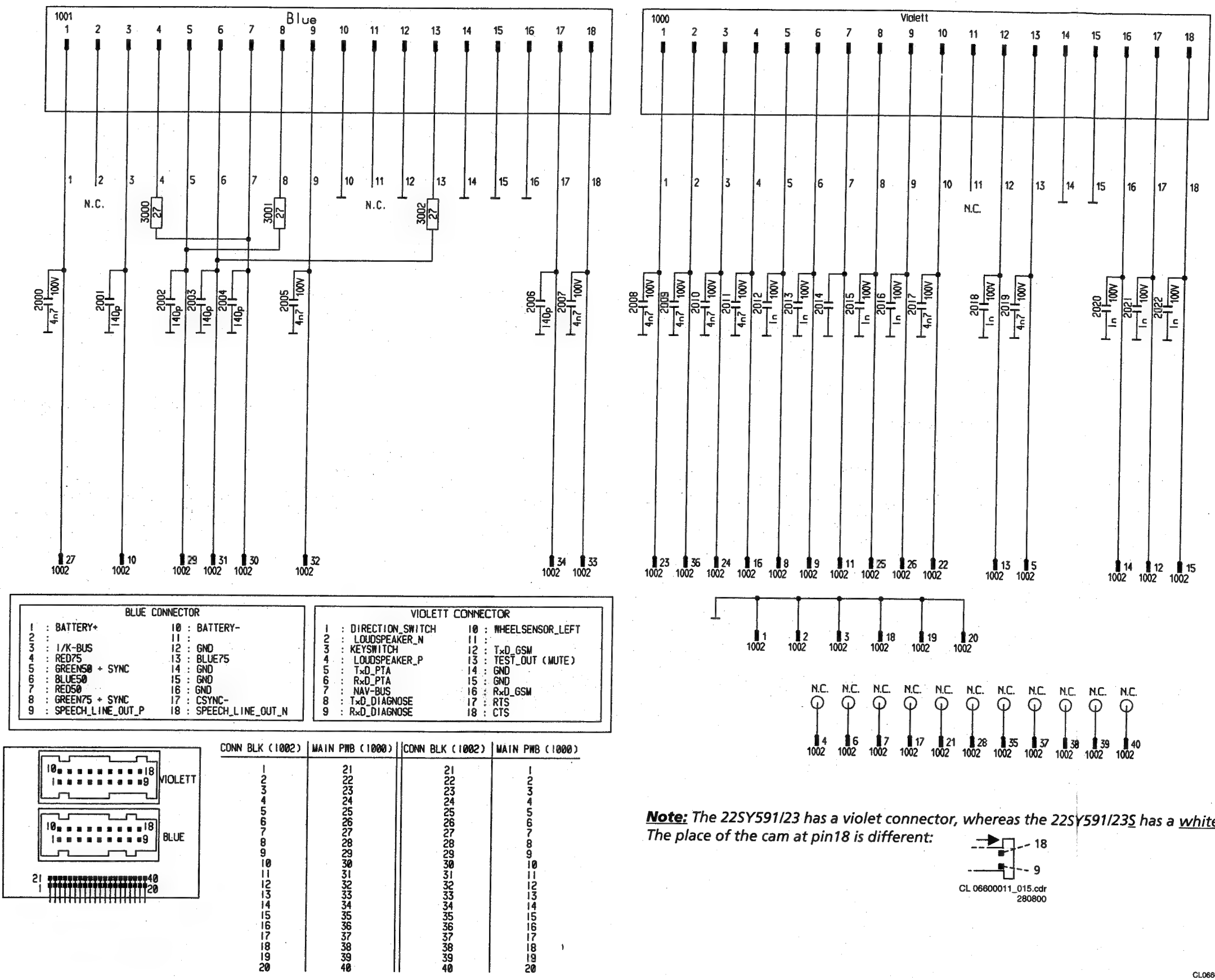
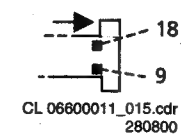


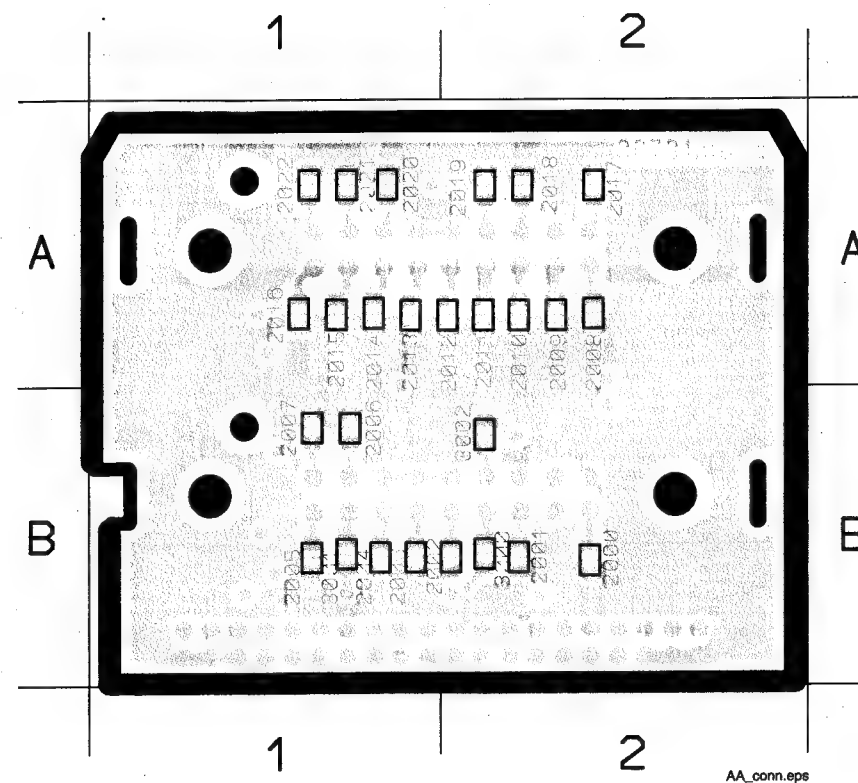
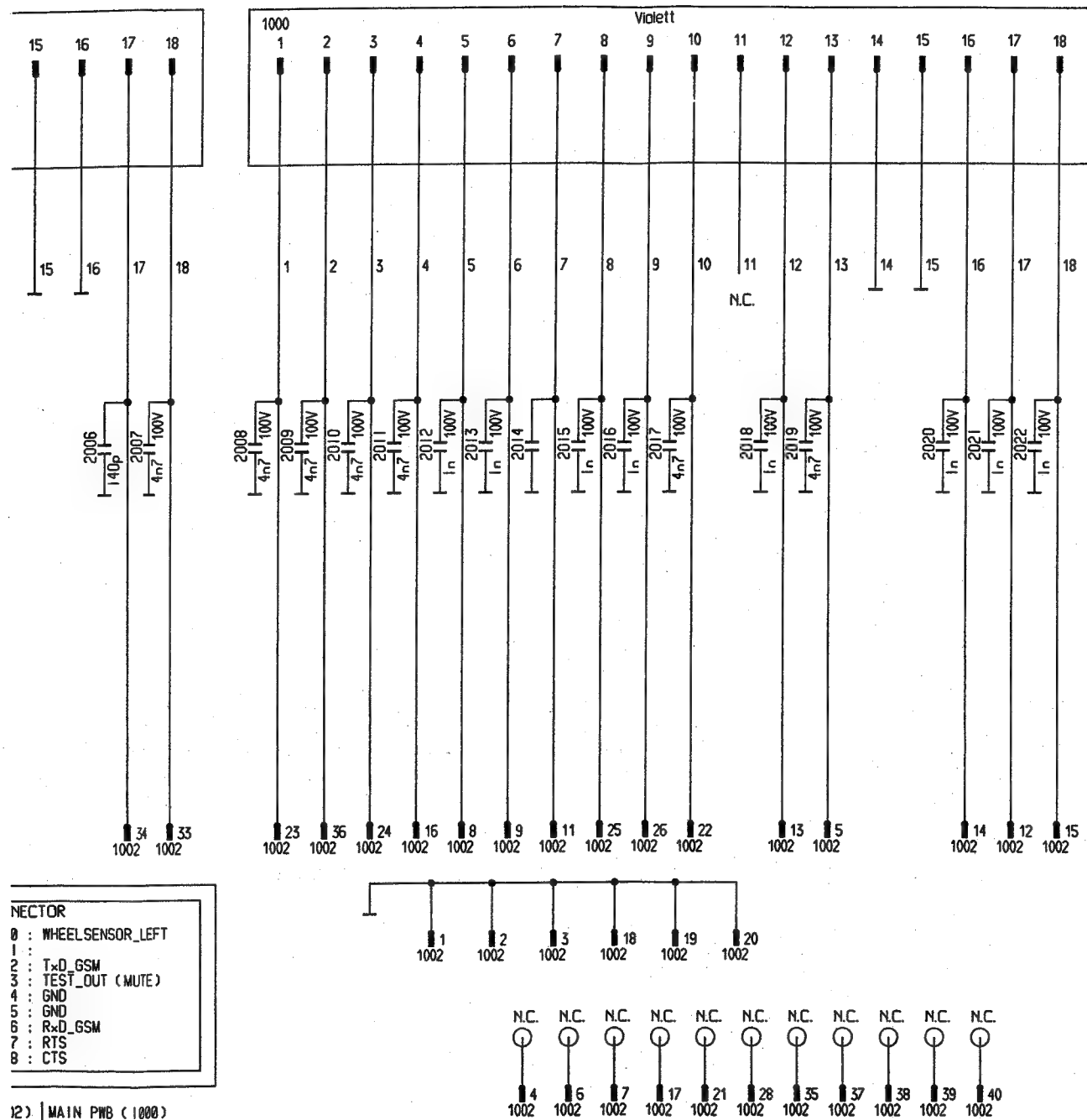
Figure vi

Connector block

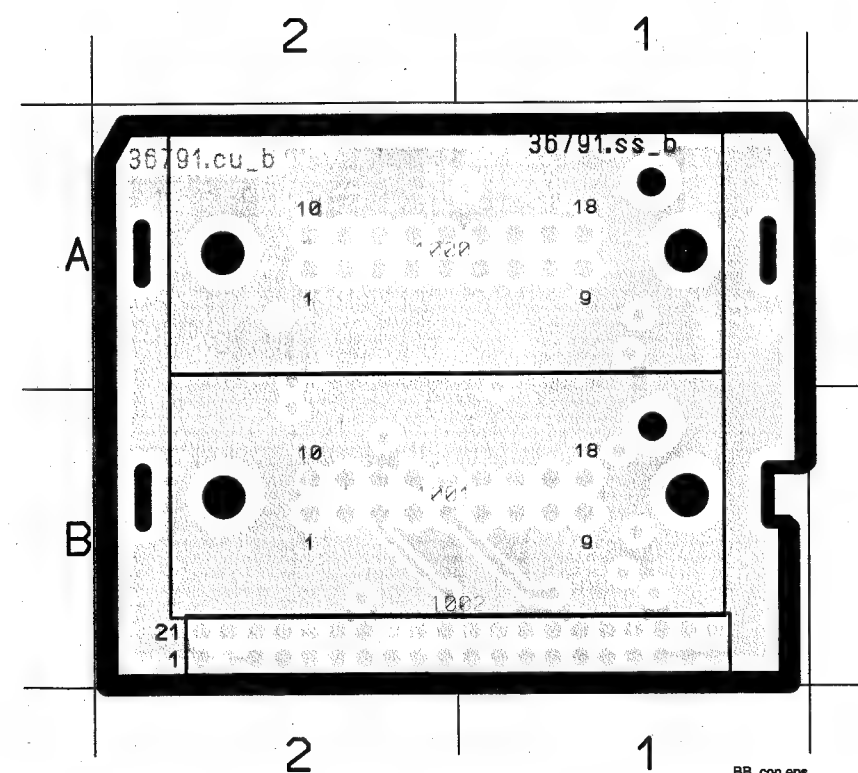


**Note:** The 22SY591/23 has a violet connector, whereas the 22SY591/23S has a white one. The place of the cam at pin18 is different:





2000 B2 2022 A1  
2001 B2 3000 B2  
2002 B2 3001 B1  
2003 B1 3002 B2  
2004 B1  
2005 B1  
2006 B1  
2007 B1  
2008 A2  
2009 A2  
2010 A2  
2011 A2  
2012 A2  
2013 A1  
2014 A1  
2015 A1  
2016 A1  
2017 A2  
2018 A2  
2019 A2  
2020 A1  
2021 A1

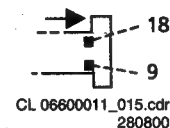


1000 A2  
1001 B2  
1002 B1

12) MAIN PWB (1000)

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20

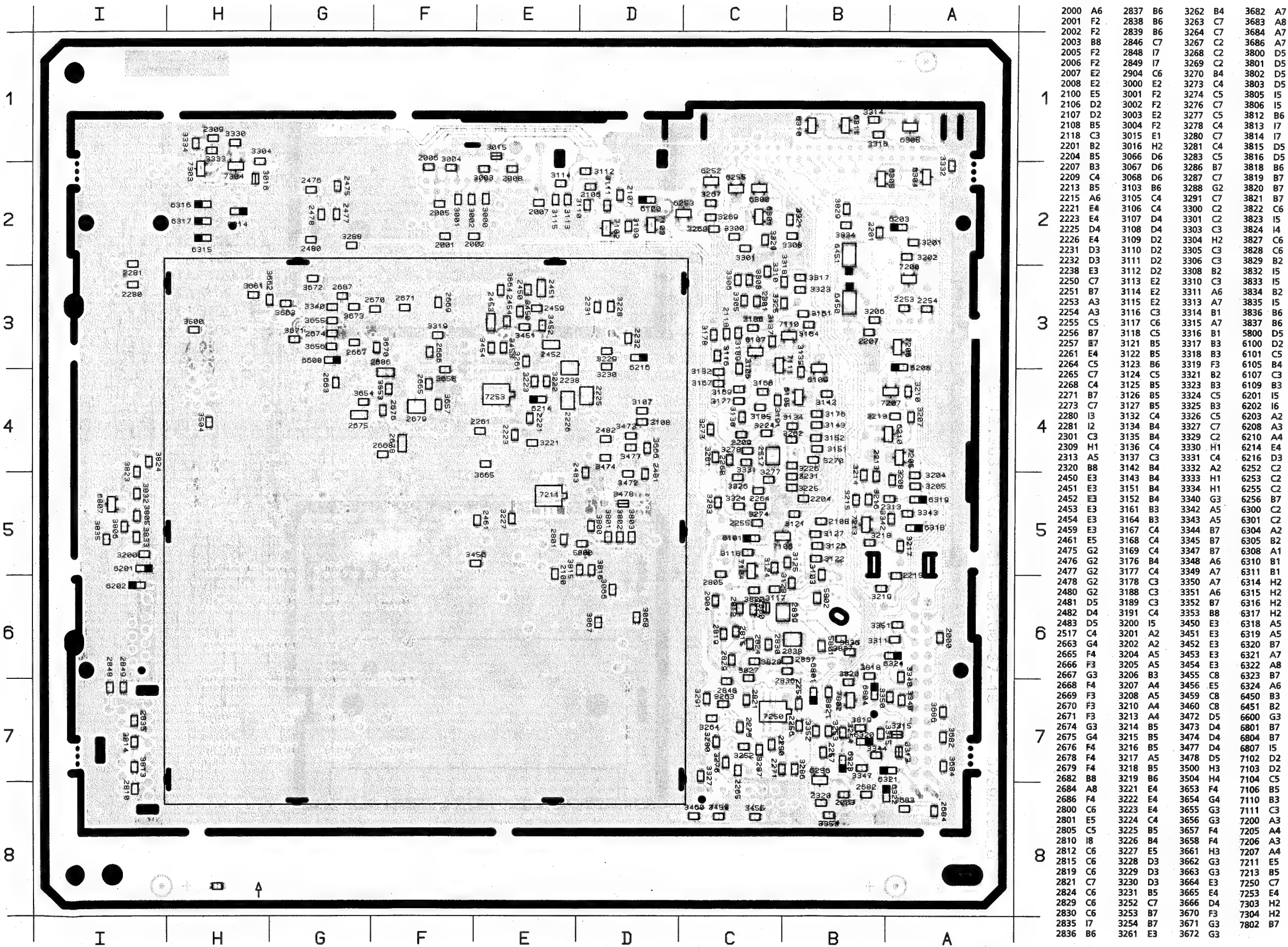
**Note:** The 22SY591/23 has a violet connector, whereas the 22SY591/23S has a white one.  
The place of the cam at pin18 is different:



CL06600011\_014.eps  
280800



### Main PCB - A side

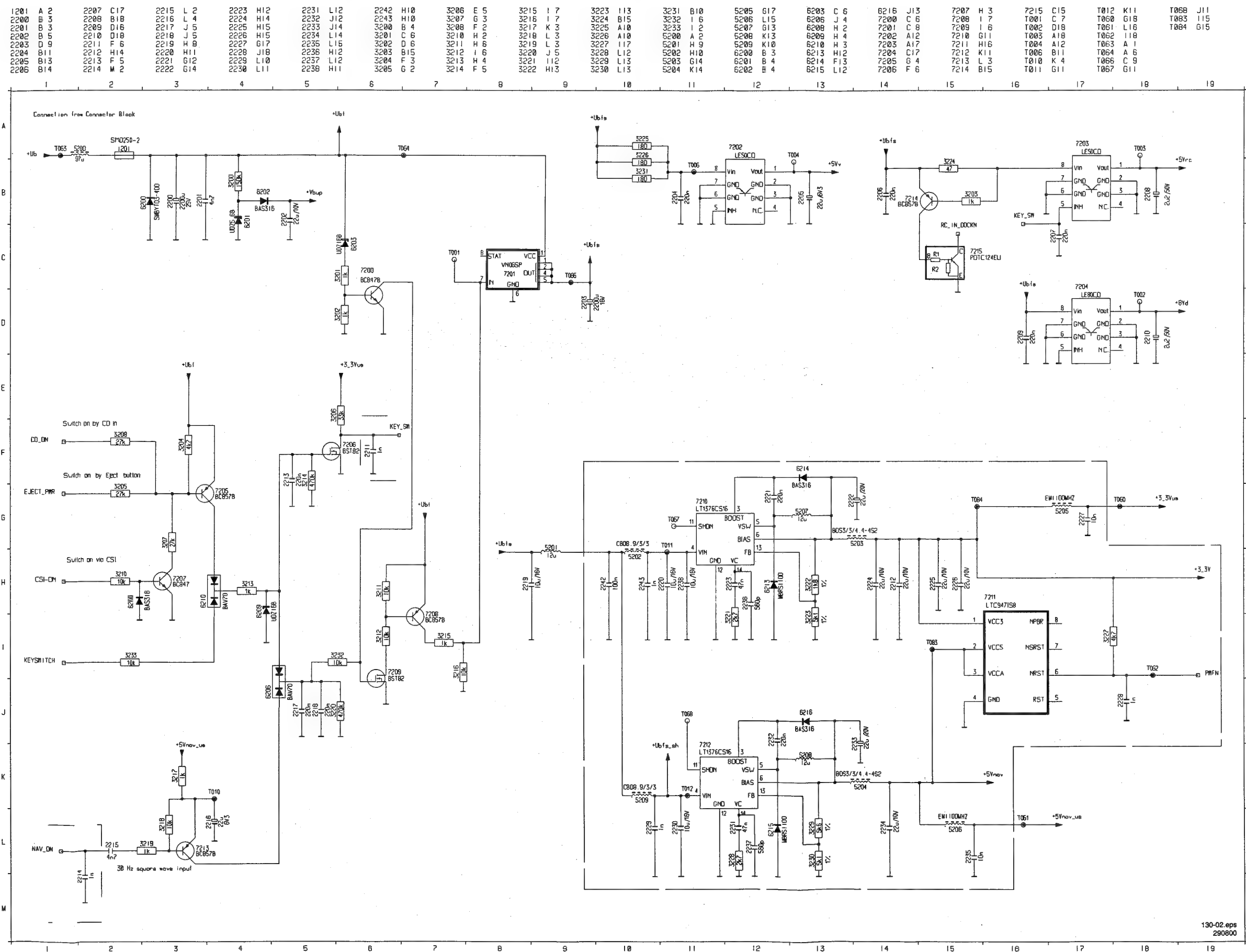


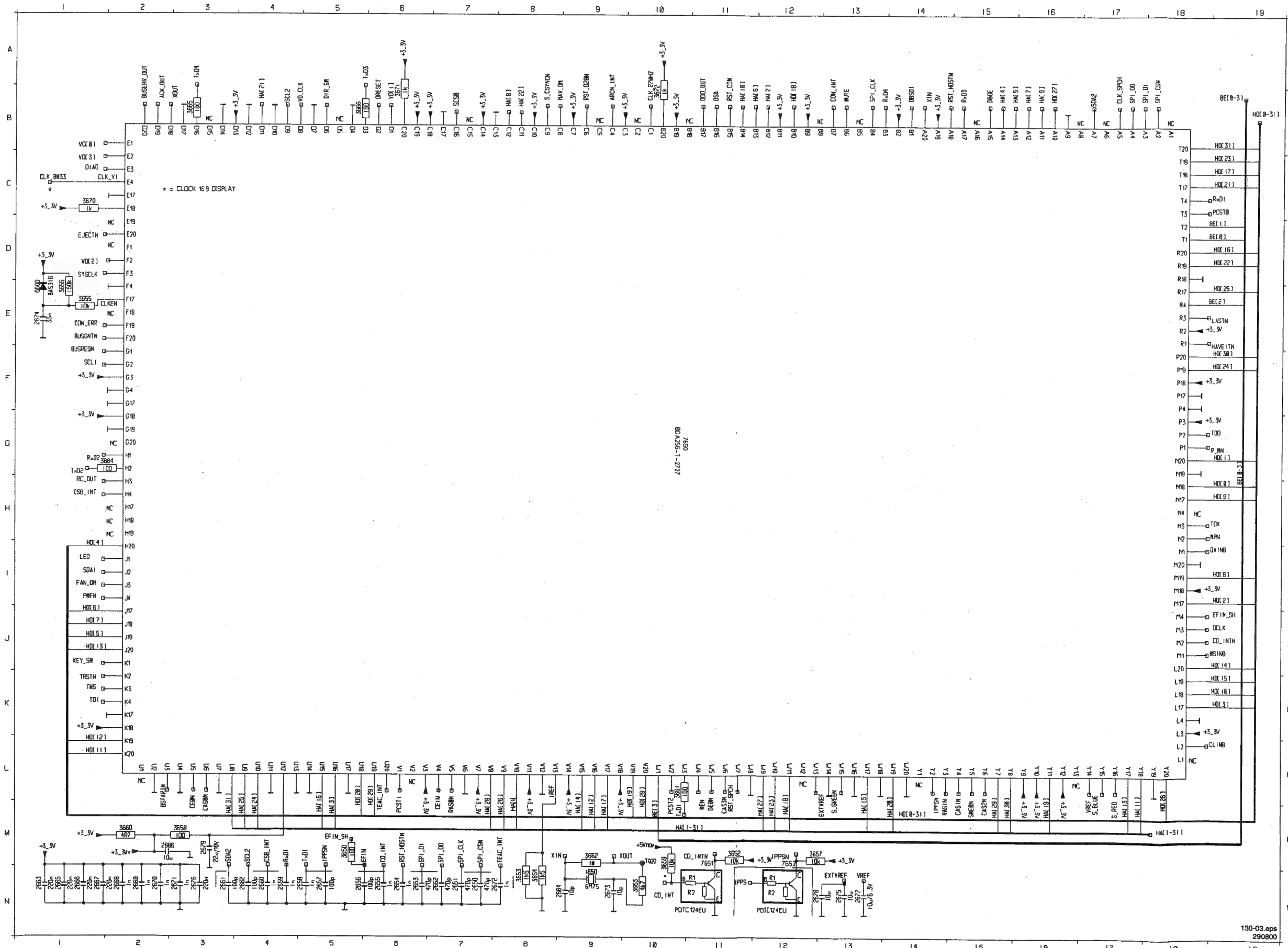
main PCB\_A.eps  
260900





Power supply

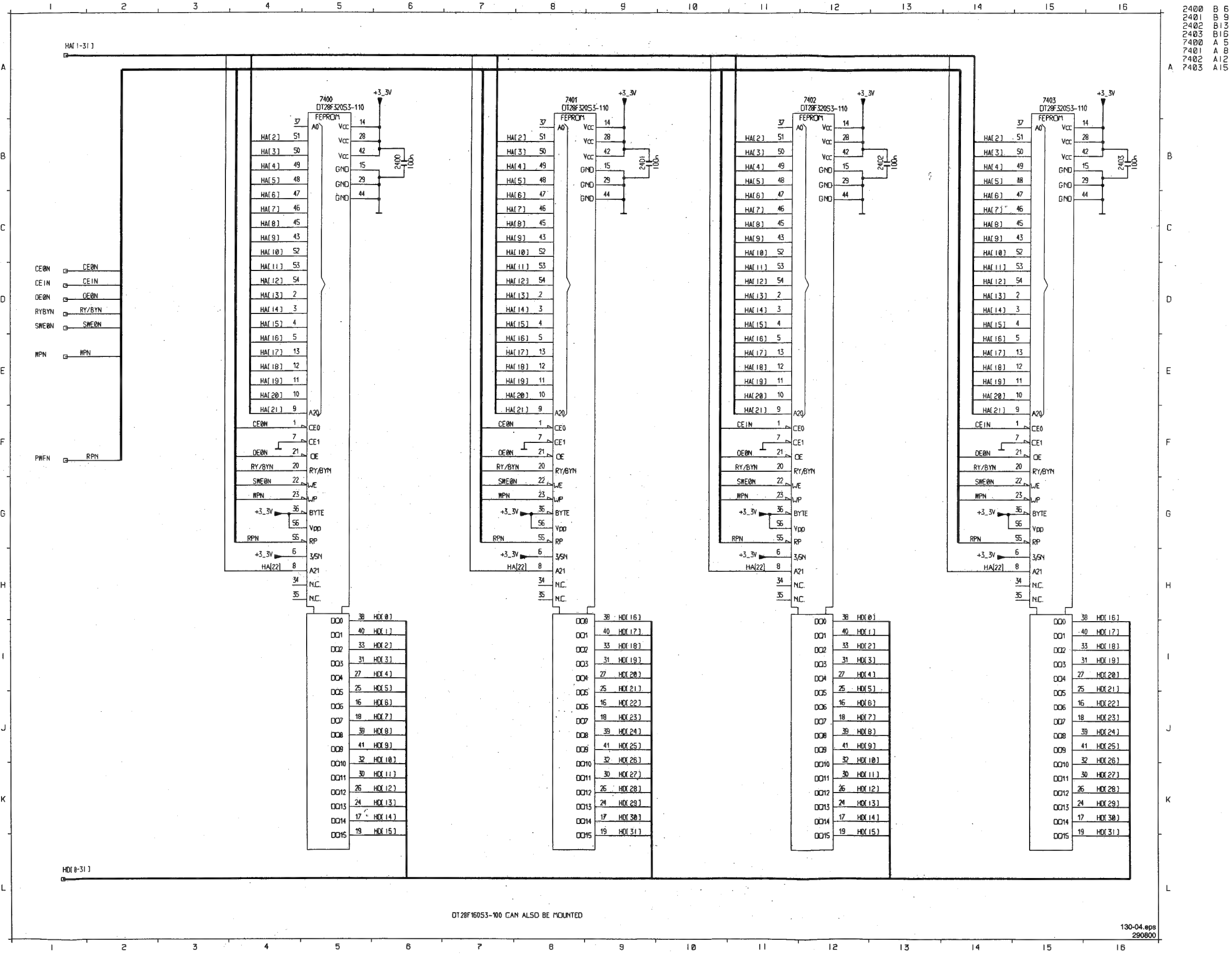


**ASIC**

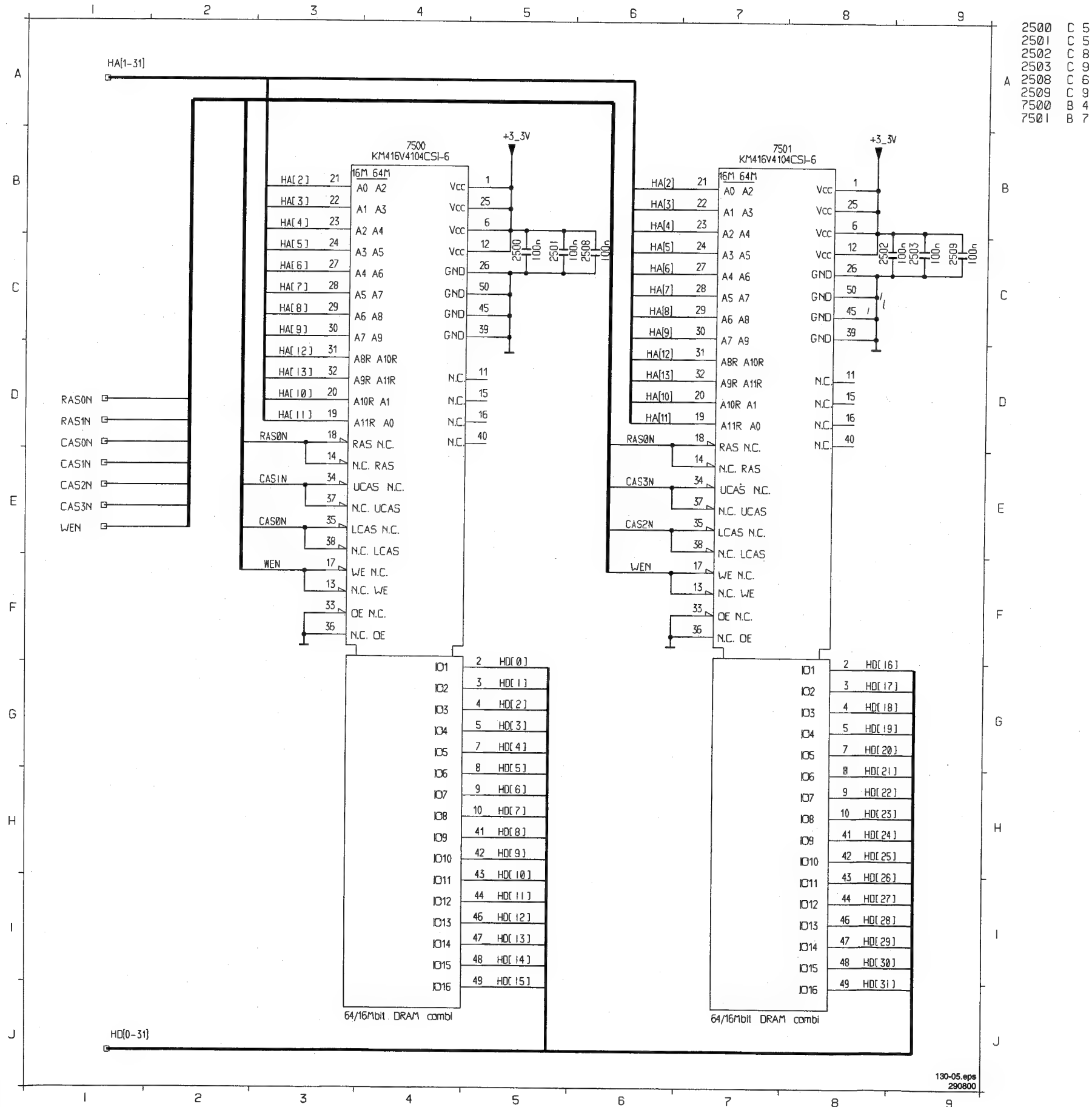
1650 N 9  
2650 N 7  
2651 N 7  
2652 N 7  
2653 N 6  
2654 N 6  
2655 N 6  
2656 N 5  
2657 N 5  
2658 N 4  
2659 N 4  
2660 N 4  
2661 N 3  
2662 N 4  
2663 N 1  
2664 N 9  
2665 N 1  
2666 N 1  
2667 N 1  
2668 N 2  
2669 N 2  
2670 N 2  
2671 N 3  
2672 N 6  
2673 N 9  
2674 E 1  
2675 N 3  
2676 N 3  
2677 N 3  
2678 N 3  
2679 W 3  
2686 W 2  
3650 W 5  
3652 M 1  
3653 N 8  
3654 N 8  
3655 E 1  
3656 E 1  
3657 M 2  
3658 M 3  
3659 M 0  
3660 M 2  
3661 L 10  
3662 M 9  
3663 N 10  
3664 G 2  
3665 B 3  
3666 B 5  
3667 B 1  
3671 B 5  
3672 B 10  
6600 E 1  
7650 G 10  
7651 M 1  
7652 M 2  
T20 M 10



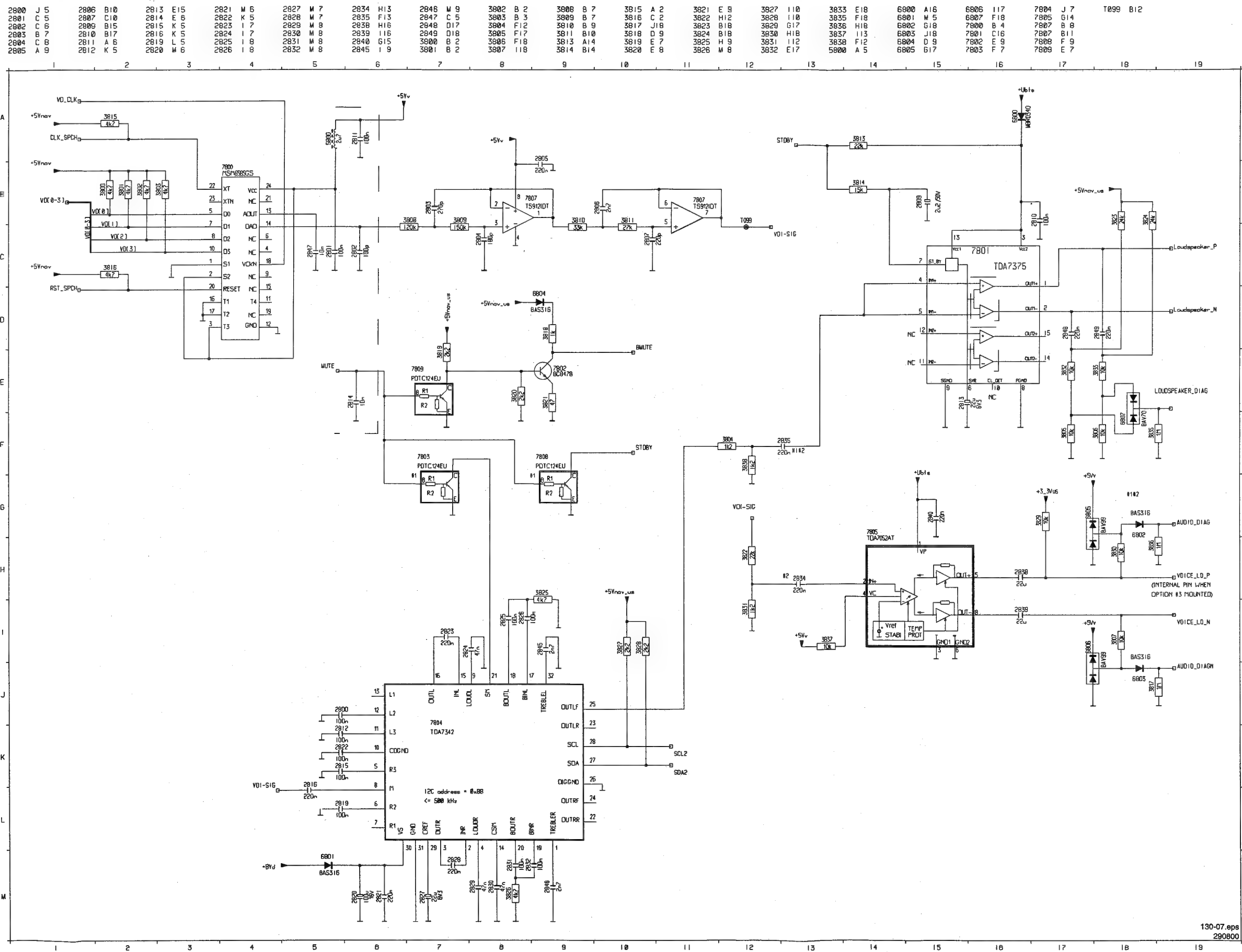
Flash memory



# DRAM



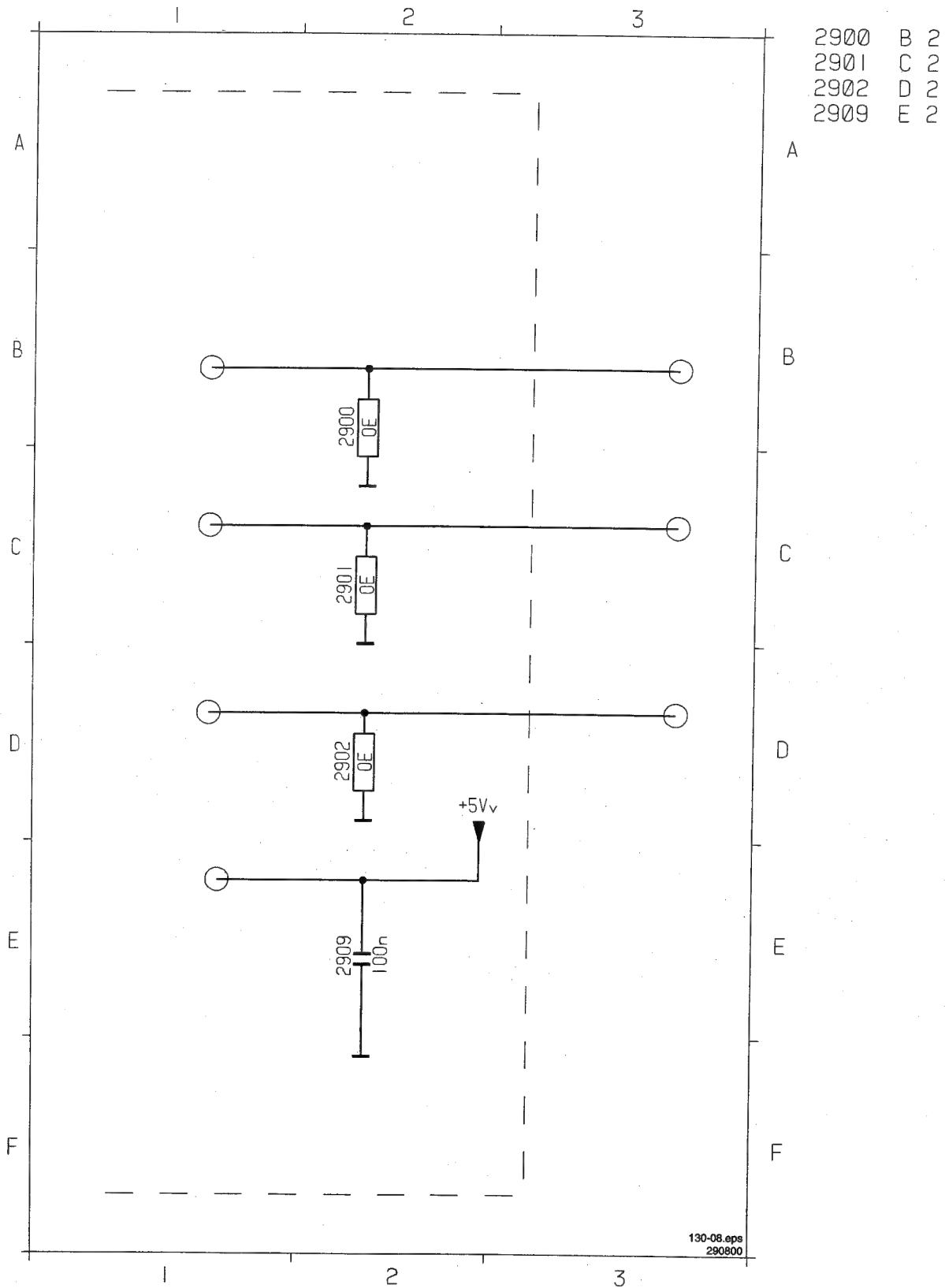
Speech & Line-out



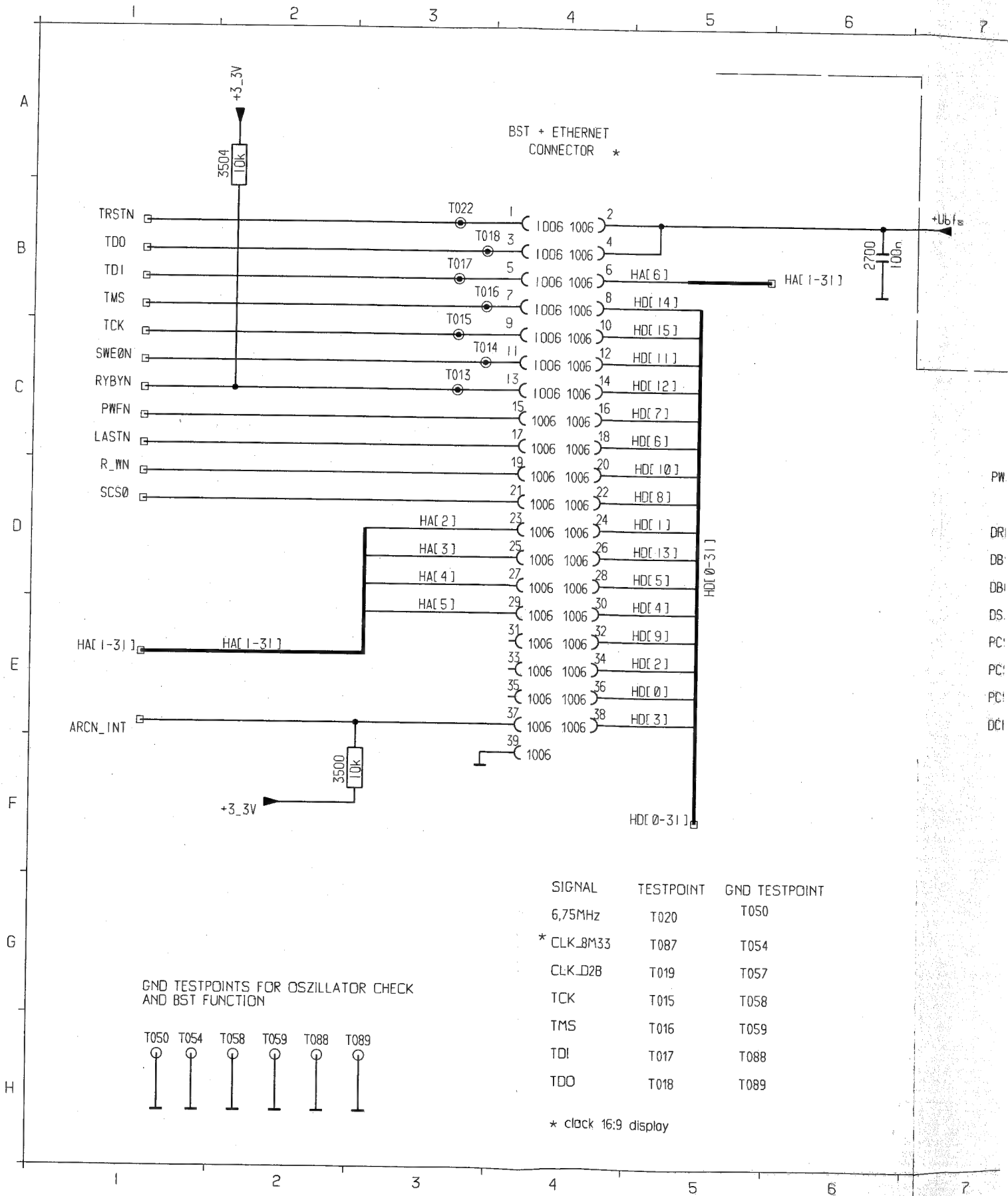
130-07.eps  
290800



CD analogue output



BST - and DEBUG connectors

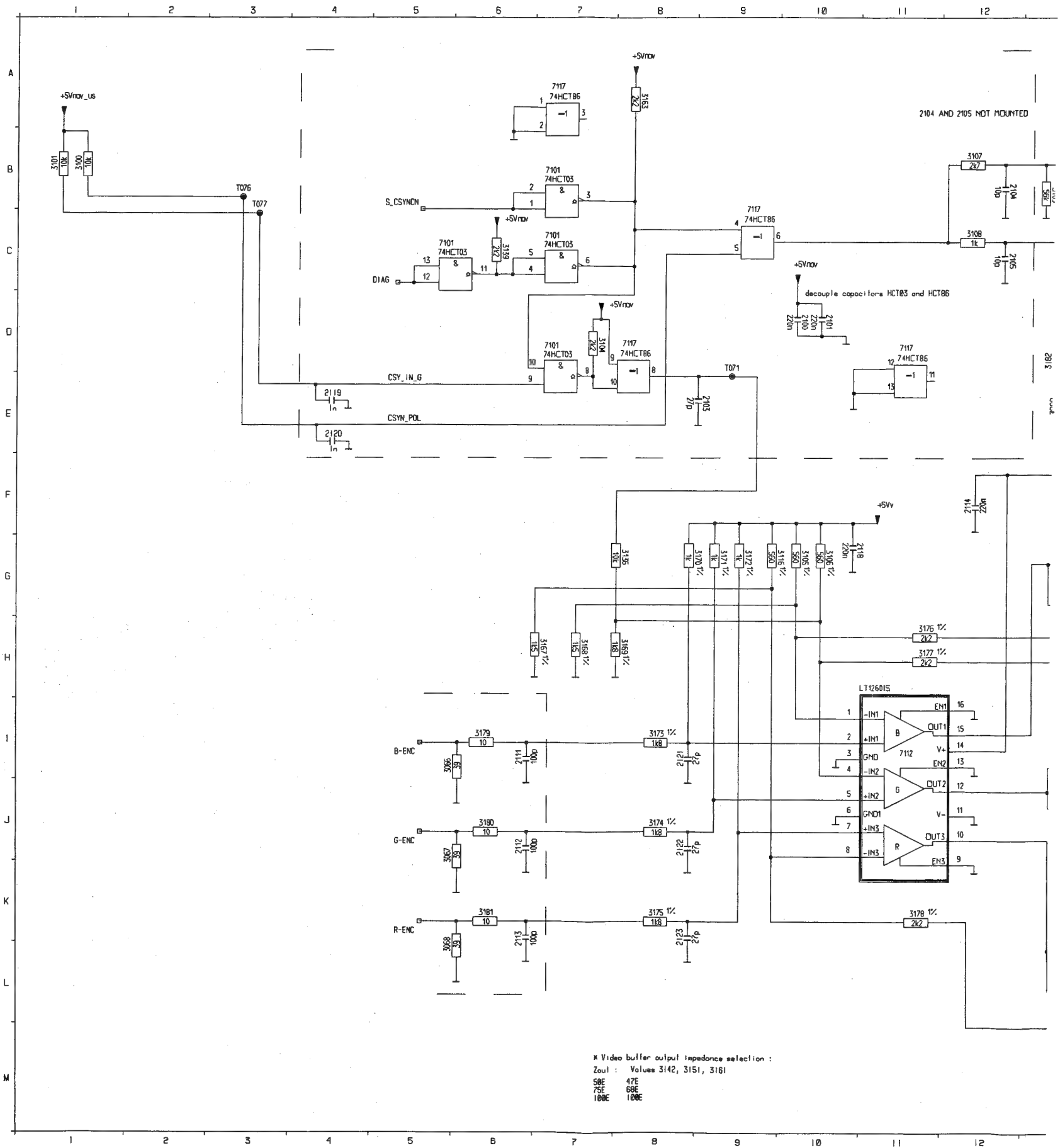
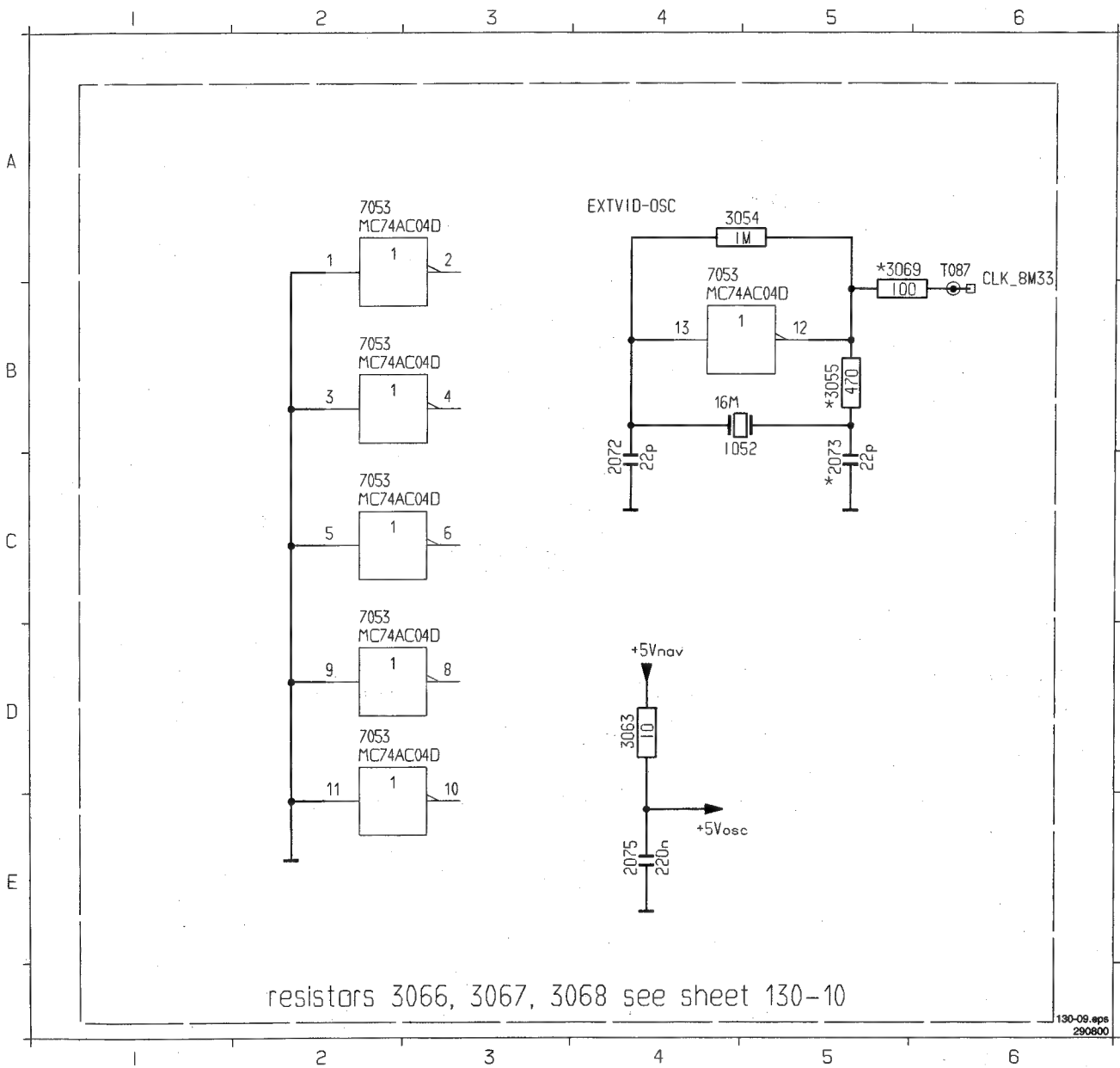


[illegible]

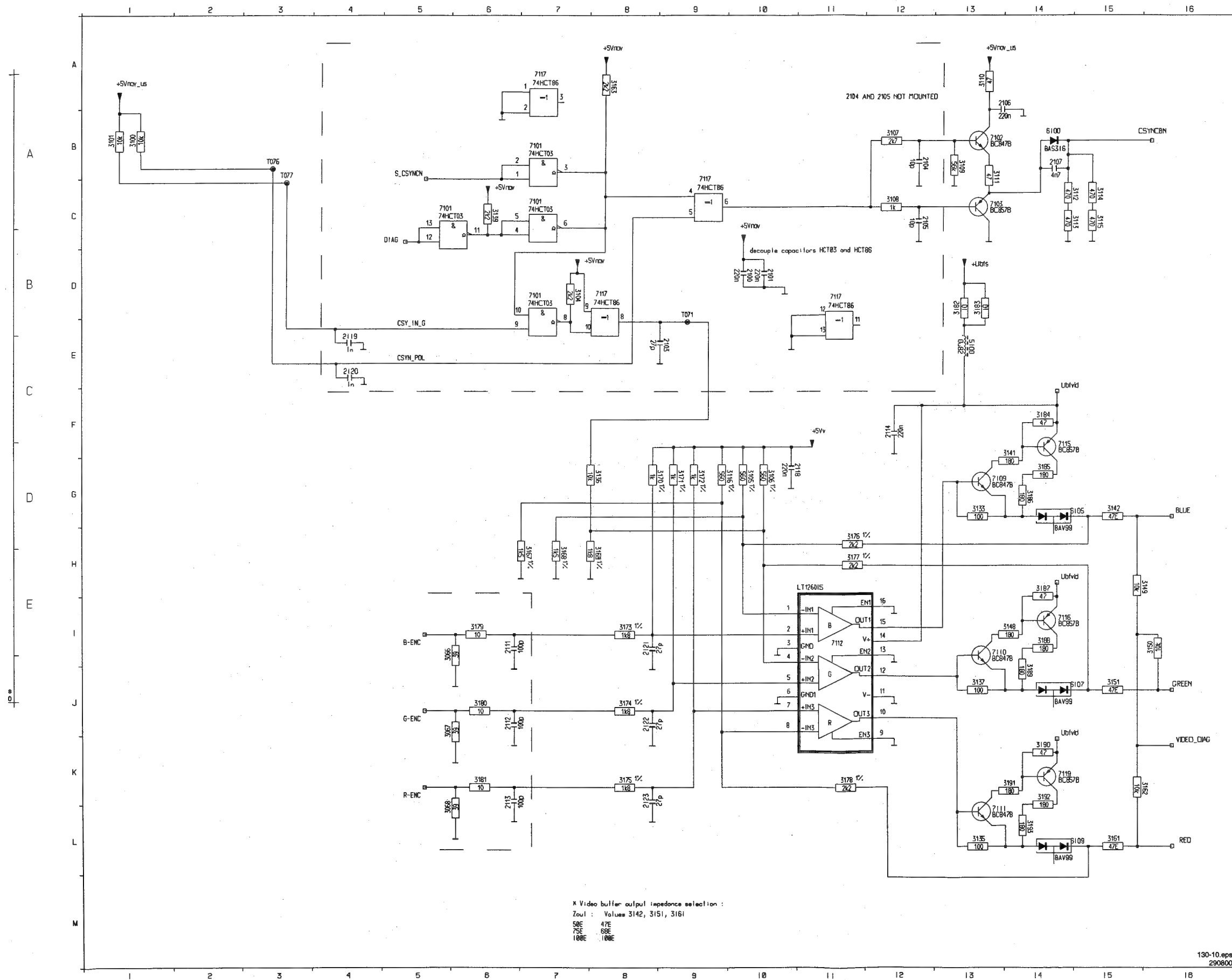
I006	B 4	T016	B 3
I006	B 4	T017	B 3
I006	B 4	T018	B 3
I006	B 4	T022	B 3
I006	B 4	T050	H 1
I006	B 4	T054	H 1
I006	B 4	T058	H 2
I006	B 4	T059	H 2
I006	C 4	T088	H 2
I006	C 4	T089	H 3
I006	C 4		
I006	C 4		
I006	C 4		
I006	C 4		
I006	C 4		
I006	C 4		
I006	C 4		
I006	D 4		
I006	D 4		
I006	D 4		
I006	D 4		
I006	D 4		
I006	D 4		
I006	D 4		
I006	D 4		
I006	E 4		
I006	E 4		
I006	E 4		
I006	E 4		
I006	E 4		
I006	E 4		
I006	E 4		
I006	E 4		
I006	F 4		
I704	D 9		
I704	D 9		
I704	D 9		
I704	D 9		
I704	D 9		
I704	D 9		
I704	D 9		
I704	D 9		
I704	D 9		
I704	D 9		
I704	E 9		
I704	E 9		
I704	E 9		
I704	E 9		
I704	E 9		
I704	E 9		
I704	E 9		
I704	E 9		
I704	E 9		
I704	E 9		
2700	B 6		
3500	F 2		
3504	A 2		
T013	C 3		
T014	C 3		
T015	C 3		

# Video interface

1052	B 4	2075	E 4	3063	D 4	7053	B 2	7053	D 2
2072	C 4	3054	A 5	3069	A 5	7053	C 2	7053	B 4
2073	C 5	3055	B 5	7053	A 2	7053	D 2	T087	A 6

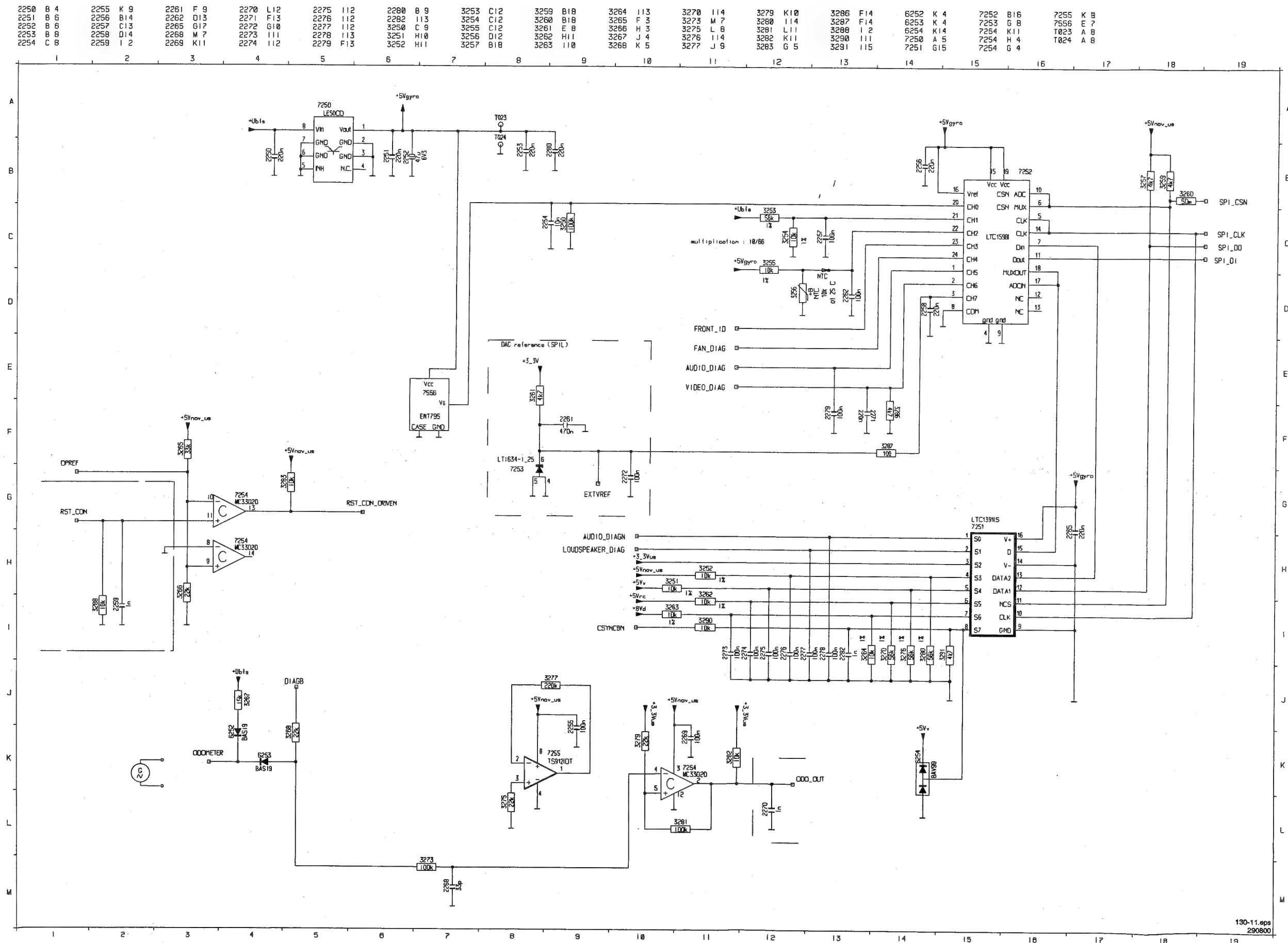


\* Video buffer output impedance selection :  
 Zout : Values 3142, 3151, 3161  
 50E 47E  
 75E 68E  
 100E 100E

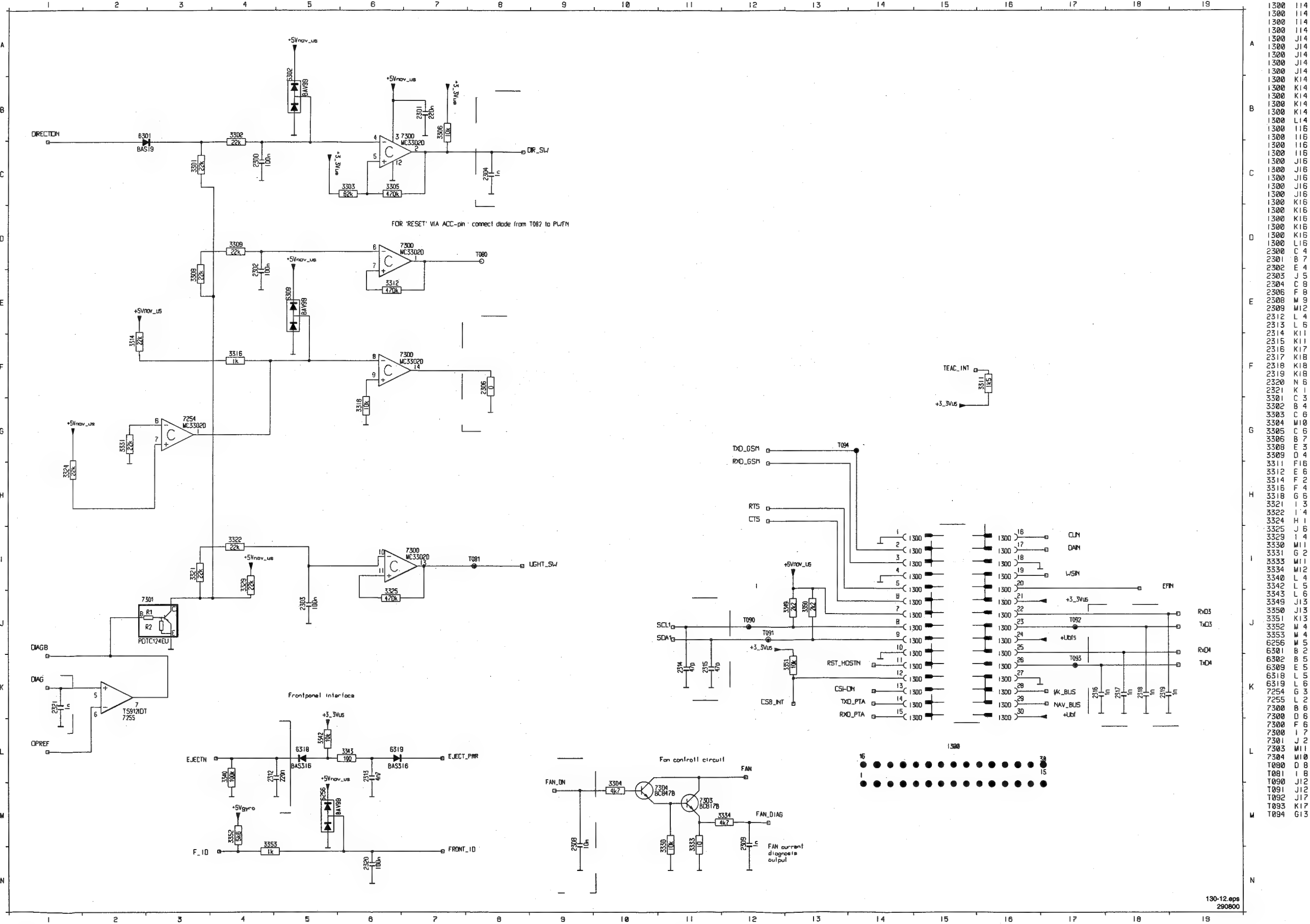


2100	D10
2101	D10
2103	E 9
2104	B12
2105	C12
2106	A13
2107	B14
2111	I 6
2112	J 6
2113	K 6
2114	F12
2118	G10
2119	E 4
2120	E 4
2121	I 8
2122	J 8
2123	K 8
3066	I 5
3067	J 5
3068	L 5
3100	B 1
3101	B 1
3104	D 7
3105	G10
3106	G10
3107	B12
3108	C12
3109	B13
3110	A13
3111	B13
3112	C15
3113	C15
3114	C15
3115	C15
3116	G10
3133	G13
3135	L13
3136	G 8
3137	J13
3139	C 6
3141	F14
3142	G15
3148	I14
3149	H16
3150	I16
3151	J15
3161	L15
3162	K16
3163	A 8
3167	H 7
3168	H 7
3169	H 8
3170	G 9
3171	G 9
3172	G 9
3173	I 8
3174	J 8
3175	K 8
3176	H11
3177	H11
3178	K11
3179	I 6
3180	J 6
3181	K 6
3182	D13
3183	D13
3184	F14
3185	G14
3186	G14
3187	H14
3188	I14
3189	J14
3190	K14
3191	K14
3192	K14
3193	L14
5100	E13
5100	B14
5105	G14
5107	J14
5109	L14
7101	B 7
7101	C 7
7101	D 7
7101	C 5
7103	B15
7103	C15
7103	C15
7110	I13
7111	L13
7112	I11
7115	F14
7116	I14
7117	A 7
7117	C 9
7117	D 8
7117	D11
7119	K14
7071	D 9
7076	B 3
7077	B 3

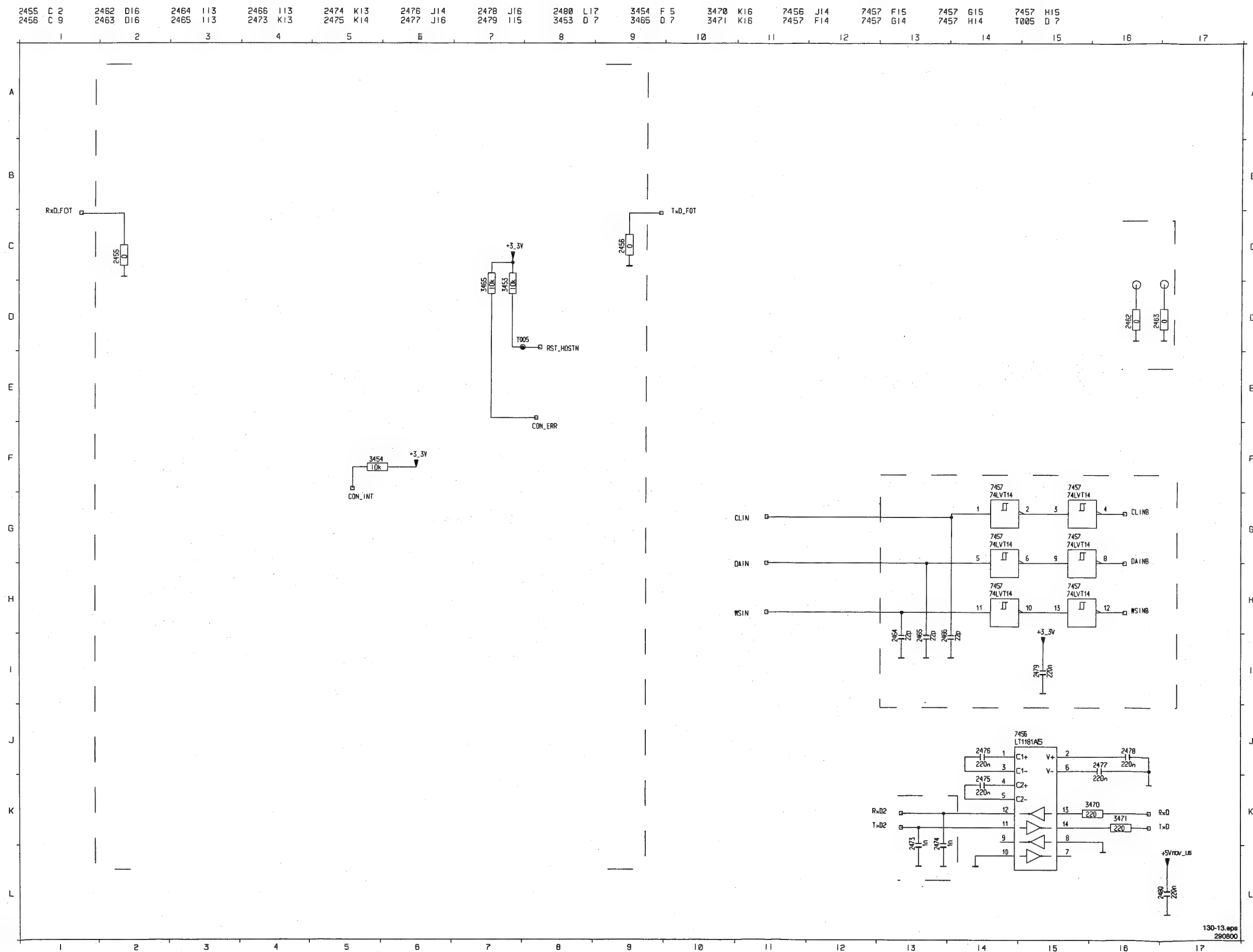
### Gyro -, ADC - & Odometer interface



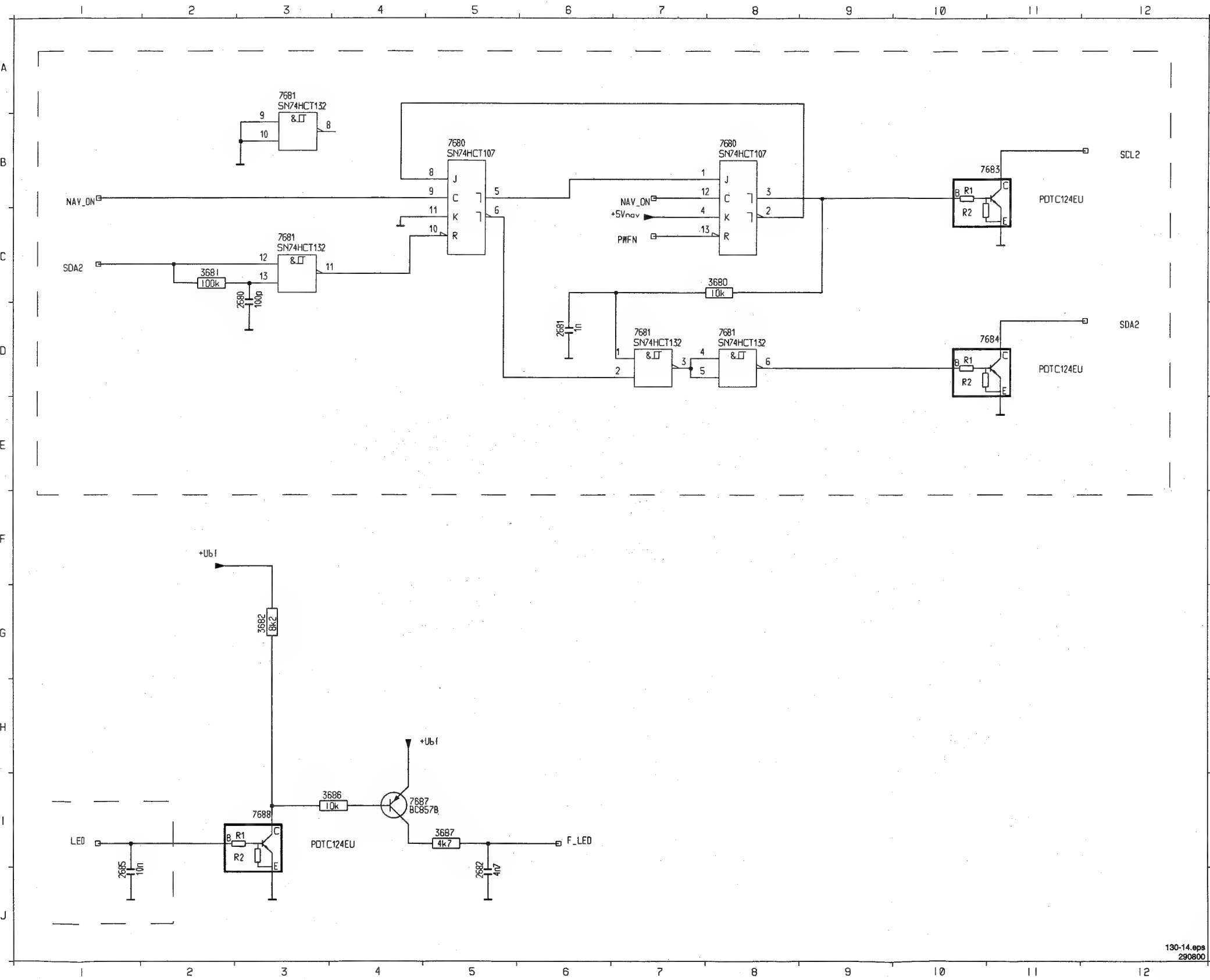
Sensor & CSB interface



## Bus interface

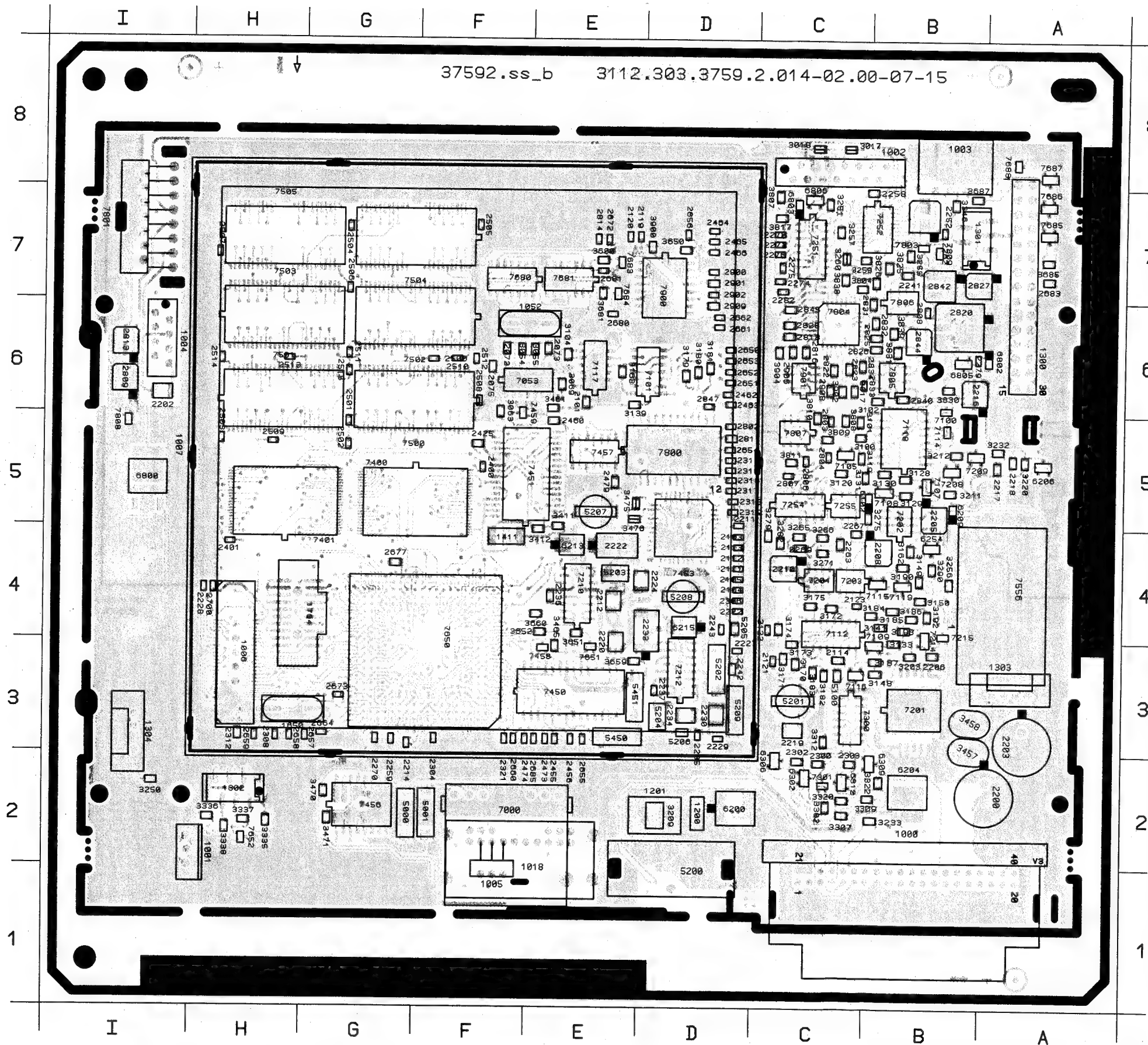


I<sup>2</sup>C & LED



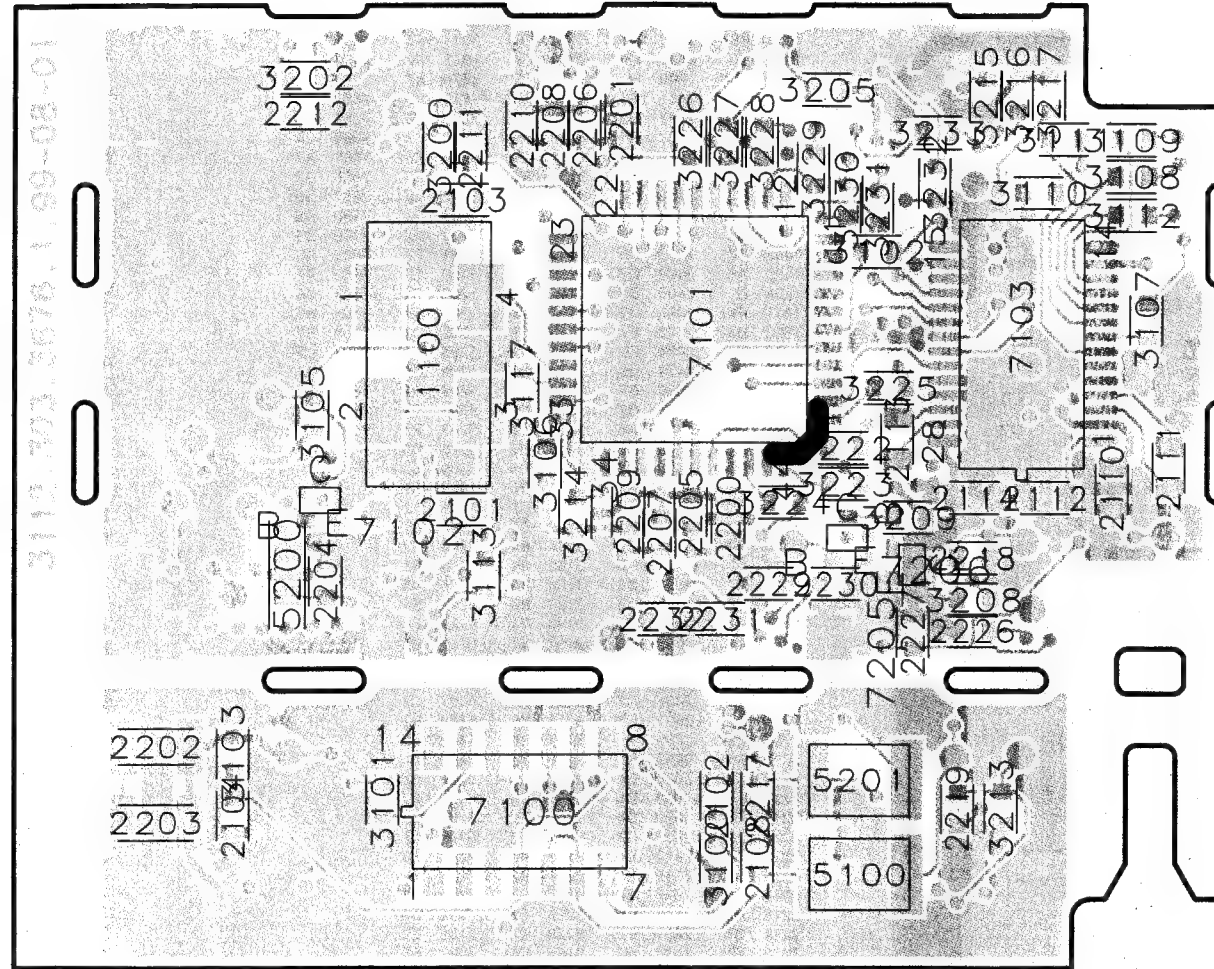
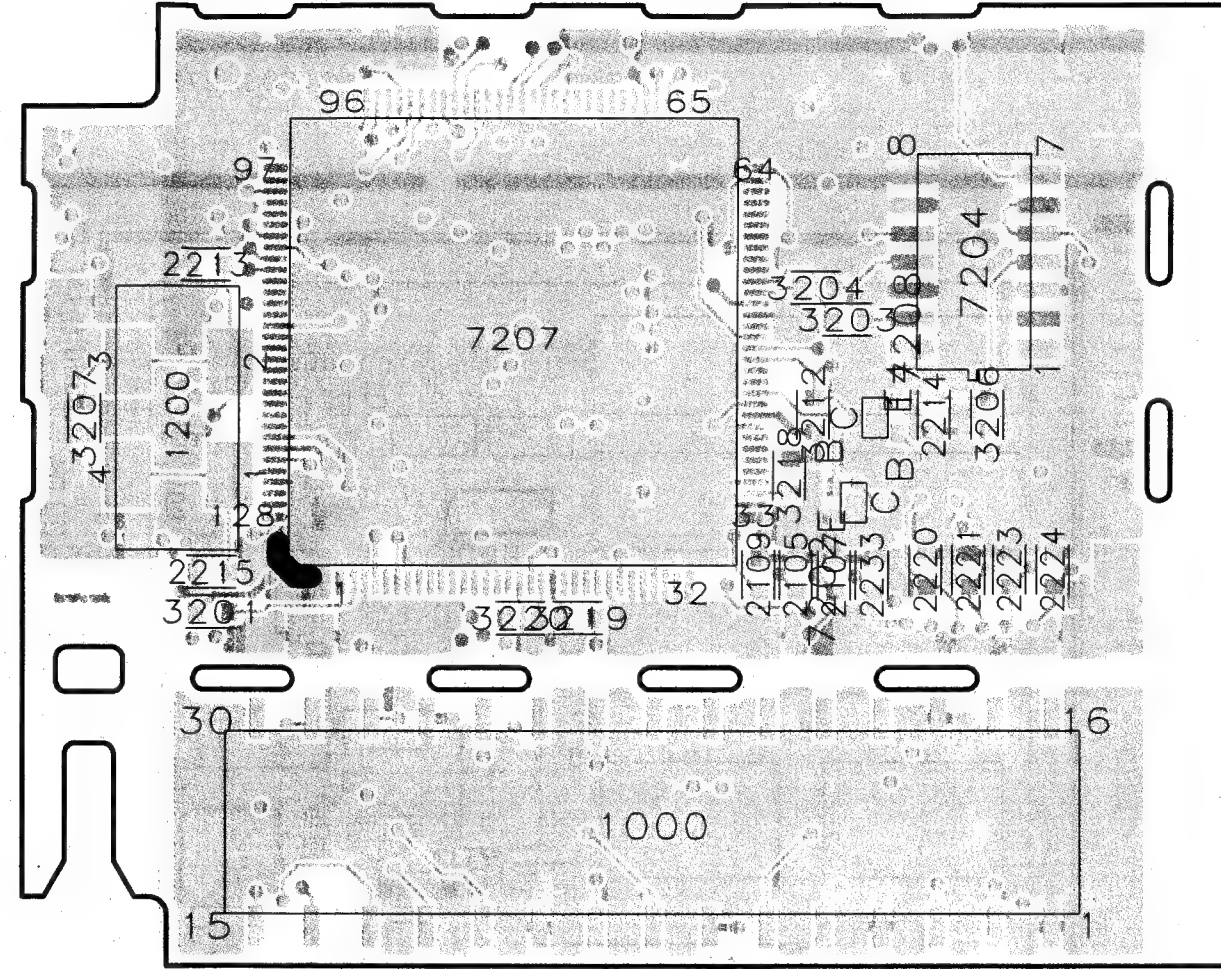
2680	C 3
2681	D 6
2682	J 5
2685	J 1
3680	C 8
3681	C 2
3682	G 3
3686	I 4
3687	I 5
7680	B 8
7680	B 5
7681	D 7
7681	D 8
7681	A 3
7681	C 3
7683	B 10
7684	D 10
7687	I 4
7688	I 3



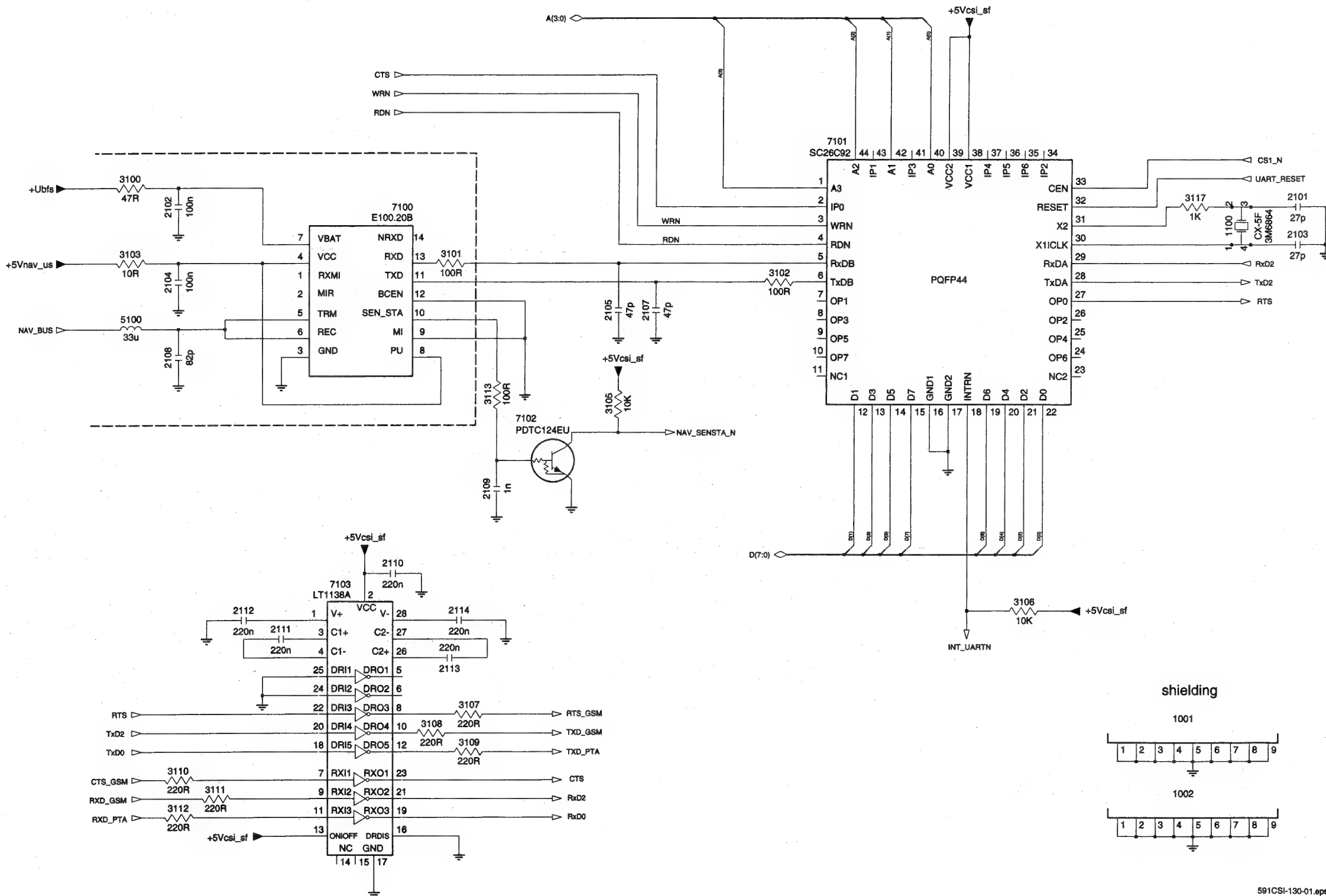


1000	B1	2316	D5	3100	C5	3809	C5	7503	H7
1001	I2	2317	D5	3101	C5	3810	C5	7556	A4
1002	C8	2318	D5	3102	B6	3811	C5	7650	F3
1003	B8	2319	D5	3104	E6	3817	C7	7651	E3
1004	I6	2321	F3	3119	C5	3825	B7	7652	H2
1005	F1	2400	F6	3120	C5	3826	B7	7680	F7
1006	H3	2401	H5	3128	B5	3830	B6	7681	E7
1007	F5	2402	G5	3129	B5	3831	B6	7683	E7
1018	F2	2403	H4	3130	B5	3838	C7	7684	E7
1052	F6	2425	F5	3131	C5	3839	B6	7685	A7
1200	D2	2455	E3	3133	B3	3900	D7	7686	A7
1201	D2	2456	E3	3139	E6	3902	C6	7687	A8
1300	A7	2460	E5	3141	B4	3904	C6	7688	A8
1301	B7	2462	D6	3148	B3	5000	G2	7800	D5
1302	H2	2463	D6	3149	B4	5001	F2	7801	I7
1303	A3	2464	D7	3150	B4	5100	C3	7803	B7
1304	I3	2465	D7	3162	B4	5200	D1	7804	C6
1411	F4	2466	D7	3163	E6	5201	C3	7805	B6
1650	H3	2473	E3	3170	C3	5202	D3	7806	B7
1704	H4	2474	F3	3171	C3	5203	E4	7807	C5
2072	F6	2479	E5	3172	C4	5204	D3	7808	I5
2073	E6	2500	G7	3173	C3	5205	D4	7809	B7
2075	F6	2501	G7	3174	C4	5206	D3	7900	D7
2101	E6	2502	G6	3175	C4	5207	E5	7901	C6
2103	D4	2503	H6	3179	D6	5208	D4		
2104	D4	2504	G8	3180	D6	5209	D3		
2105	D4	2505	F8	3181	D6	5450	E3		
2111	D4	2506	G7	3182	C3	5451	E3		
2112	D4	2507	H7	3183	C3	6102	B5		
2113	D4	2508	G7	3184	B4	6200	D2		
2114	C3	2509	H6	3185	B4	6204	B2		
2119	E7	2650	D6	3186	B4	6206	A5		
2120	E7	2651	D6	3187	B3	6209	B5		
2121	C3	2652	D6	3190	B4	6213	E4		
2122	C4	2653	D6	3192	B4	6215	D4		
2123	C4	2654	D5	3193	B4	6254	B4		
2200	A2	2655	E3	3203	B3	6302	C2		
2202	I6	2656	D7	3209	D2	6306	C2		
2203	A3	2657	G3	3211	B5	6309	B2		
2205	B5	2658	H3	3212	B5	6312	C2		
2206	B3	2659	H3	3220	A5	6800	I5		
2208	B4	2660	F3	3232	A5	6802	A6		
2210	C4	2661	D6	3233	B2	6803	C7		
2211	D5	2662	D6	3250	I2	6805	B6		
2212	E4	2664	G3	3251	C7	6806	C7		
2214	G3	2672	E7	3255	B7	7000	F2		
2216	B6	2673	G3	3256	B4	7053	F6		
2217	A5	2677	G4	3257	C7	7100	B6		
2218	A5	2680	E6	3259	C7	7101	D6		
2219	C3	2681	E7	3260	C7	7105	C5		
2220	E3	2683	A7	3265	C4	7107	B5		
2222	E4	2685	E3	3266	C4	7108	B5		
2224	D4	2700	H4	3271	C4	7109	B3		
2227	D3	2802	D5	3275	B5	7112	C4		
2228	H4	2803	C5	3279	C4	7114	B5		
2229	D3	2804	C5	3282	C4	7115	B4		
2230	D3	2806	C5	3290	B4	7116	C3		
2233	D4	2807	C5	3302	C2	7117	E6		
2234	D3	2809	I6	3307	C2	7118	B5		
2235	D3	2811	D5	3309	B2	7119	B4		
2236	E4	2813	I6	3312	C3	7201	B3		
2237	D3	2814	E7	3320	C2	7202	B5		
2241	B7	2816	C6	3322	B2	7203	C4		
2242	D3	2817	C6	3335	H2	7204	C4		
2243	D4	2818	C6	3336	H2	7208	B5		
2252	B7	2820	B6	3337	H2	7209	B5		
2258	B7	2822	C6	3338	H2	7210	E4		
2259	G3	2823	C6	3346	B7	7212	D3		
2262	B7	2825	B6	3411	E5	7214	B4		
2263	C4	2826	B6	3412	E4	7215	B4		
2267	C4	2827	B7	3457	B3	7251	C7		
2269	C4	2828	C6	3458	B3	7252	B7		
2270	G3	2831	B6	3461	E6	7254	C5		
2272	D4	2832	B6	3465	E3	7255	C5		
2274	C7	2834	C6	3470	G2	7300	C3		
2275	C7	2840	B6	3471	G2	7301	C2		
2276	C7	2842	B7	3475	E5	7400	G6		
2277	C7	2844	B6	3476	E5	7401	H6		
2278	C7	2845	C6	3650	D7	7402	G5		
2279	B6	2847	D6	3651	E4	7403	H5		
2282	C7	2900	D7	3652	E4	7450	E3		
2300	C2	2901	D7	3659	E3	7451	F5		
2302	C2	2902	D7	3660	E4	7453	D4		
2303	C2	2906	C6	3680	E7	7456	G2		
2304	F3	2908	C6	3681	E7	7457	E5		
2306	D4	2909	D6	3685	A7	7458	E3		
2308	H3	3054	F6	3687	B7	7459	F5		
2312	H3	3055	E6	3804	C7	7500	G7		
2314	D5	3063	F6	3807	C7	7501	H7		
2315	D5	3069	E6	3808	C5	7502	G7		

## CSB PCB layouts

csi\_a.eps  
290800csi\_b.eps  
290800

## CSB - Interfaces

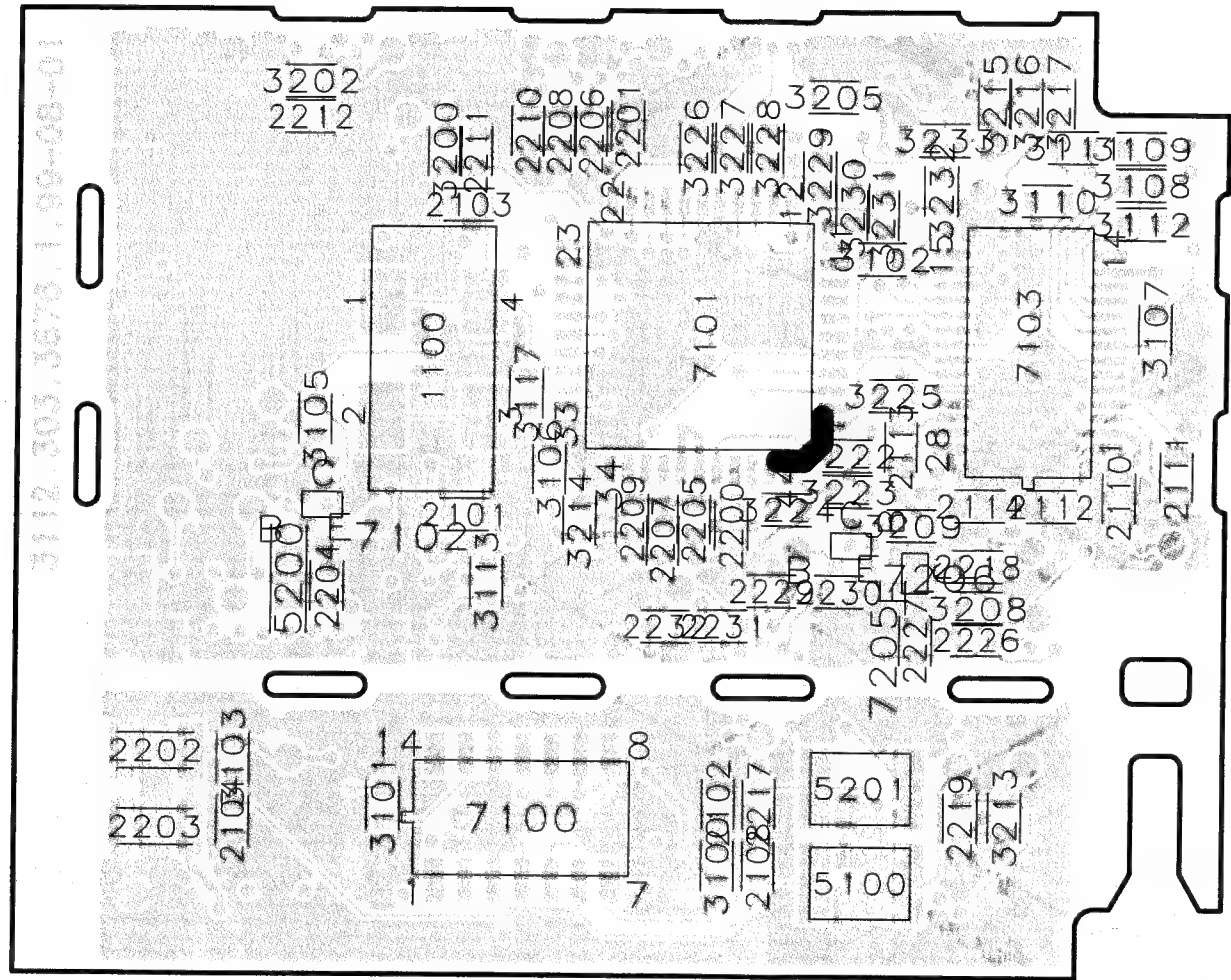


**22SY591**



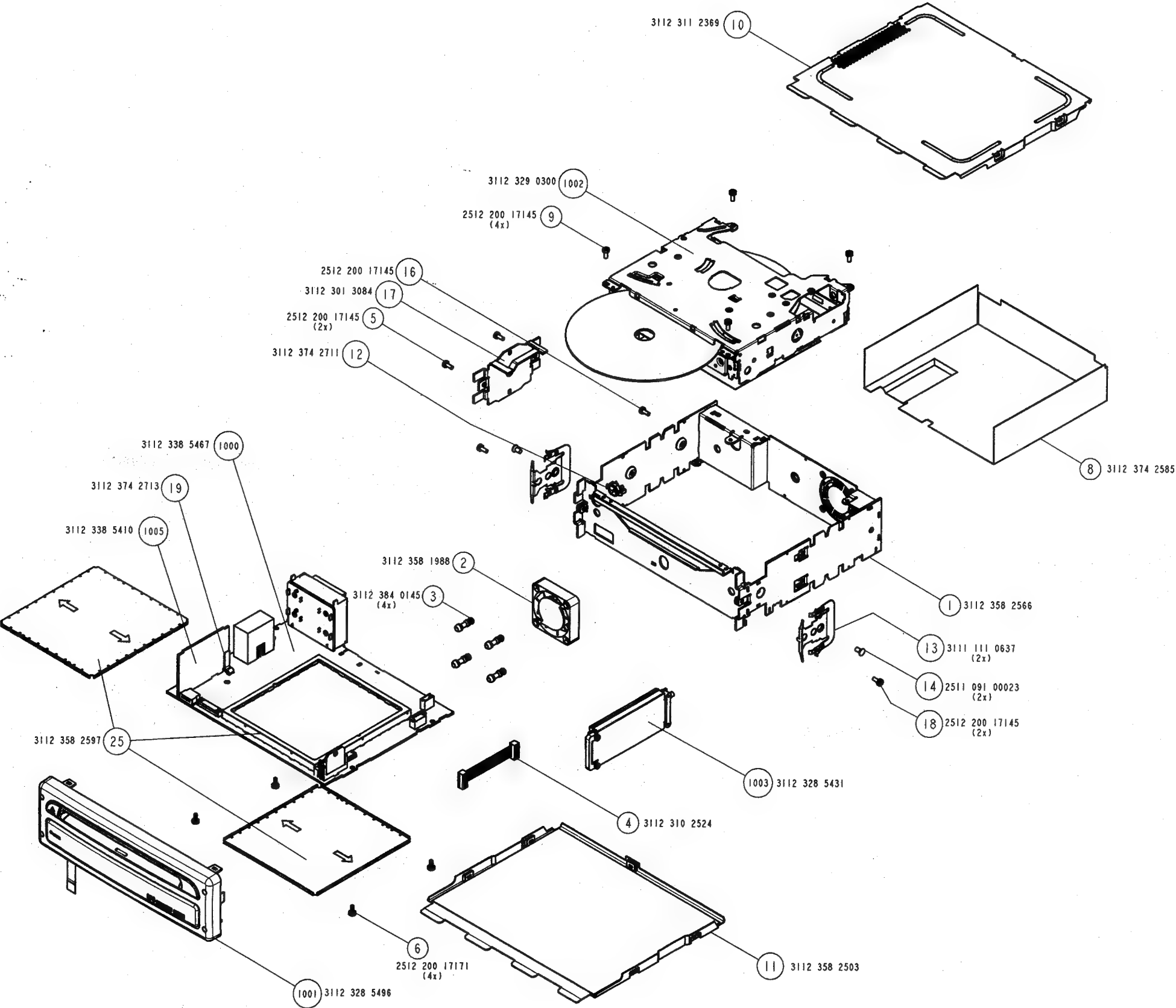


## CSB PCB layouts

csi\_a.eps  
290800



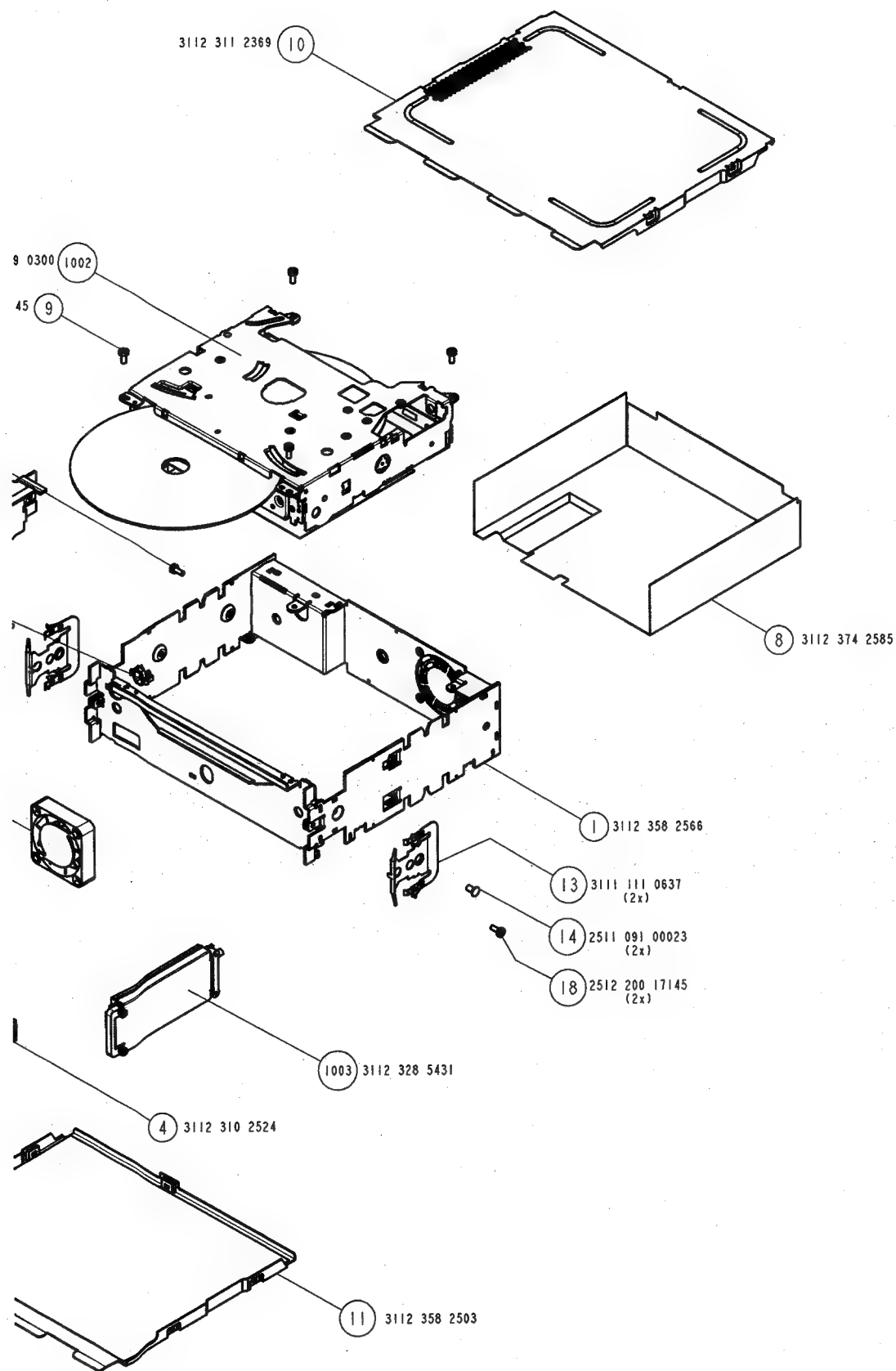
Exploded view



Mechanical pa

Remark: Unless oth

POS.	SPARE
0001	
0002	X
0003	X
0004	X
0005	
0006	
0007	X
0008	X
0009	
0010	X
0011	X
0012	
0013	X
0014	
0016	
0017	
0018	
0019	
0020	
0021	
0022	
0023	
0024	
0025	X
0026	
0027	
0028	
0031	
0350	
1000	
1001	X
1002	X
1002	X
1003	X
1004	X
1005	X



## Mechanical parts

Remark: Unless otherwise noted, all parts are valid for both -/23 and -23S versions.

POS.	SPARE	CODE NUMBER	ARTICLE DESCRIPTION
0001			FRAME ASSY
0002	X	482236111069	FAN ASSY
0003	X	482253212988	FAN STRING
0004	X	482232012297	CABLE ASSY GPS-MODULE
0005			SCR PAN TAP ST ZN YE M2.5X6
0006			SCR PAN TAP ST ZN GN M2.5X5
0007	X	311234125030	COVER EMC
0008	X	311237425850	SCREENING DUST
0009			SCR PAN TAP ST ZN YE M2.5X6
0010	X	311231123690	COVER TOP
0011	X	311235825030	COVER BOTTOM ASSY
0012			HOLDER CSB
0013	X	482249271046	SPRING MOUNTING
0014			SCR CSK TORX TAP ST ZN M3X6
0016			SCR PAN TAP ST ZN YE M2.5X6
0017			BRACKET GYRO (ONLY 22SY591/23)
0018			SCR PAN TAP ST ZN YE M2.5X6
0019			HOLDER
0020			LABEL SEAL STANDARD
0021			LABEL
0022			LABEL FINAL CONTROL
0023			LABEL WHITE/GREEN
0024			LABEL SW LICENSE
0025	X	311235825970	COVER ASSY EMC
0026			LABEL PRODIS
0027			LABEL US MARKET SY500/23
0028			LABEL D18 BLUE (ONLY 22SY591/23S)
0031			LABEL WHITE/GREEN
0350			THERMOFOIL AVERY 105 UNIVERSAL
1000			PWB ASSY MAIN
1001	X	311232854960	UNIT ASSY FRONT
1002	X	482269110732	MODULE ASSY CDM-M2 2.3E PACKED (22SY591/23)
1002	X	311232903040	MODULE ASSY CDM-M2 8.3 PACKED (22SY591/23S)
1003	X	311232854310	GPS RECEIVER ASSY SHIELDED
1004	X	311232854940	GYRO ASSY 90DEG (ONLY 22SY591/23S)
1005	X	311233854100	PWB ASSY CSB



## Electrical parts

Only parts with a code number are available as spares! Unless otherwise noted, all parts are valid for both -/23 and -/235 versions.

### CONNECTOR BLOCK

1000	311233853190	PWB ASSY CONNECTOR BLOCK (225Y591/23)
1000	311233854430	PWB ASSY CONNECTOR BLOCK (225Y591/235)

### MAIN PCB

1001	242202511684	CON BM V 3P M 2.50 5483 B	2221		CER2 0805 X7R 16V 220N PM10 R
1002	482226511508	CON BM V 14P F 1.27 RD R	2222	202202900458	TANCAP SM B45A 20V 22U PM20 R
1003	482226510813	CON BM H 6P F 1.25 FFC 0.3 B	2223		CER2 0805 X7R 16V 47N PM10 R
1004	482226750872	CON BM V 8P F 1.27 215079 B	2224		CER2 1210 Y5V 10V 22U P8020 R
1005	—	NOT PRESENT	2225		CER2 1210 Y5V 10V 22U P8020 R
1006	—	NOT PRESENT	2226		CER2 1210 Y5V 10V 22U P8020 R
1007	—	FRAME EMC	2227		CER2 0603 X7R 50V 10N PM10 R
1018	—	NOT PRESENT	2228		CER2 0603 X7R 50V 1N PM10 R
1052	242254301071	RES XTL SM 16MHZ0 7P CX-49G R	2229		CER2 0603 X7R 50V 1N PM10 R
1200	—	NOT PRESENT	2230		CER2 1210 Y5V 16V 10U P8020 R
1201	212266200109	PTC SM 3426 15V 0R085 PM R	2231		CER2 0805 X7R 16V 47N PM10 R
1300	242202516597	CON BM V 30P M 2.54 MODU II B	2232		CER2 0805 X7R 16V 220N PM10 R
1301	—	NOT PRESENT	2233	202202900458	TANCAP SM B45A 20V 22U PM20 R
1302	—	NOT PRESENT	2234		CER2 1210 Y5V 10V 22U P8020 R
1303	—	NOT PRESENT (225Y591/23)	2235		CER2 0603 X7R 50V 10N PM10 R
1303	482226531105	CON BM V 4P F 2.00 (225Y591/235)	2236		CER1 0805 NPO 50V 560P PM5 R
1304	—	NOT PRESENT	2237		CER2 0603 X7R 50V 560P PM10 R
1411	—	NOT PRESENT	2238		CER2 1210 Y5V 16V 10U P8020 R
1650	242254301074	RES XTL SM 6MHZ75 7P CX-49G R	2241	—	NOT PRESENT
1704	—	NOT PRESENT	2242		CER2 0805 X7R 25V 100N PM10 R
2000	—	CER2 0805 X7R 100V 4N7 PM10 R	2243		CER2 0603 X7R 50V 1N PM10 R
2001	—	NOT PRESENT	2250		CER2 0805 X7R 16V 220N PM10 R
2002	—	NOT PRESENT	2251		CER2 0805 X7R 16V 220N PM10 R
2003	—	CER2 0805 X7R 100V 4N7 PM10 R	2252	202002490349	ELCAP SM VS 6V3 47U PM20 R
2005	—	NOT PRESENT	2253		CER2 0805 X7R 16V 220N PM10 R
2006	—	NOT PRESENT	2254		CER2 0805 X7R 50V 10N PM10 R
2007	—	NOT PRESENT	2255		CER2 0805 X7R 25V 100N PM10 R
2008	—	NOT PRESENT	2256		CER2 0805 X7R 16V 220N PM10 R
2072	—	CER1 0805 NPO 50V 22P PM5 R	2257		CER2 0805 X7R 25V 100N PM10 R
2073	—	CER1 0805 NPO 50V 22P PM5 R	2258		CER2 0805 X7R 16V 220N PM10 R
2075	—	CER2 0805 X7R 16V 220N PM10 R	2259		CER2 0603 X7R 50V 1N PM10 R
2100	—	CER2 0805 X7R 16V 220N PM10 R	2261		CER2 0805 X7R 16V 470N PM20 R
2101	—	CER2 0805 X7R 16V 220N PM10 R	2262		CER2 0603 X7R 16V 100N PM10 R
2103	—	CER1 0603 NPO 50V 27P PM5 R	2263	—	NOT PRESENT
2104	—	CER1 0603 NPO 50V 10P PM5 R	2264	—	NOT PRESENT
2105	—	CER1 0603 NPO 50V 10P PM5 R	2265		CER2 0805 X7R 16V 220N PM10 R
2106	—	CER2 0805 X7R 16V 220N PM10 R	2266	—	NOT PRESENT
2107	—	CER2 0805 X7R 100V 4N7 PM10 R	2267		CER1 0805 NPO 50V 33P PM5 R
2108	—	NOT PRESENT	2268		CER2 0805 X7R 25V 100N PM10 R
2111	—	CER1 0603 NPO 50V 100P PM5 R	2269		CER2 0603 X7R 50V 1N PM10 R
2112	—	CER1 0603 NPO 50V 100P PM5 R	2270		CER2 0805 X7R 16V 220N PM10 R
2113	—	CER1 0603 NPO 50V 100P PM5 R	2271		CER2 0603 X7R 16V 100N PM10 R
2114	—	CER2 0805 X7R 16V 220N PM10 R	2272		CER2 0805 X7R 25V 100N PM10 R
2118	—	CER2 0805 X7R 16V 220N PM10 R	2273		CER2 0603 X7R 16V 100N PM10 R
2119	—	CER2 0603 X7R 50V 1N PM10 R	2274		CER2 0603 X7R 16V 100N PM10 R
2120	—	CER2 0603 X7R 50V 1N PM10 R	2275		CER2 0603 X7R 16V 100N PM10 R
2121	—	CER1 0603 NPO 50V 27P PM5 R	2276		CER2 0603 X7R 16V 100N PM10 R
2122	—	CER1 0603 NPO 50V 27P PM5 R	2277		CER2 0603 X7R 16V 100N PM10 R
2123	—	CER1 0603 NPO 50V 27P PM5 R	2278		CER2 0603 X7R 16V 100N PM10 R
2200	202002490702	ELCAP M 25V S 2200U PM20 B	2279		CER2 0603 X7R 16V 100N PM10 R
2201	—	CER2 0805 X7R 100V 4N7 PM10 R	2280		CER2 0805 X7R 16V 220N PM10 R
2202	—	CER2 1210 Y5V 10V 22U P8020 R	2281	—	NOT PRESENT
2203	202002191487	ELCAP VZ 16V S 2200U PM20 B	2282		CER2 0603 X7R 50V 1N PM10 R
2204	—	CER2 0805 X7R 16V 220N PM10 R	2300		CER2 0805 X7R 25V 100N PM10 R
2205	482212481061	ELCAP SM VS 6V3 22U PM20 R	2301		CER2 0805 X7R 16V 220N PM10 R
2206	—	CER2 0805 X7R 16V 220N PM10 R	2302		CER2 0805 X7R 25V 100N PM10 R
2207	—	CER2 0805 X7R 16V 220N PM10 R	2303		CER2 0805 X7R 25V 100N PM10 R
2208	482212412194	ELCAP SM VS 50V 2U2 PM20 R	2304		CER2 0603 X7R 50V 1N PM10 R
2209	—	CER2 0805 X7R 16V 220N PM10 R	2306		RST SM 0603 JUMP. MAX 0R05 R
2210	482212412194	ELCAP SM VS 50V 2U2 PM20 R	2308		CER2 0603 X7R 50V 10N PM10 R
2211	—	CER2 0603 X7R 50V 1N PM10 R	2309		CER2 0805 X7R 50V 1N PM10 R
2212	—	CER2 1210 Y5V 10V 22U P8020 R	2312		CER2 0805 X7R 16V 220N PM10 R
2213	—	CER2 0805 X7R 16V 220N PM10 R	2313		CER2 0805 X7R 100V 4N7 PM10 R
2214	—	CER2 0603 X7R 50V 1N PM10 R	2314		CER1 0603 NPO 50V 47P PM5 R
2215	—	CER2 0805 X7R 100V 4N7 PM10 R	2315		CER1 0603 NPO 50V 47P PM5 R
2216	482212481061	ELCAP SM VS 6V3 22U PM20 R	2316		CER2 0603 X7R 50V 1N PM10 R
2217	—	CER2 0805 X7R 16V 220N PM10 R	2317		CER2 0603 X7R 50V 1N PM10 R
2218	—	CER2 0805 X7R 16V 220N PM10 R	2318		CER2 0603 X7R 50V 1N PM10 R
2219	—	CER2 1210 Y5V 16V 10U P8020 R	2319		CER2 0603 X7R 50V 1N PM10 R
2220	—	CER2 1210 Y5V 16V 10U P8020 R	2320		CER2 0805 X7R 25V 100N PM10 R
			2321		CER2 0603 X7R 50V 1N PM10 R

2400		CER2 0603 X7R 16V 100N PM10 R	2800		CER2 0805 X7R 25V 100N PM10 R
2401		CER2 0603 X7R 16V 100N PM10 R	2801		CER2 0805 X7R 25V 100N PM10 R
2402		CER2 0603 X7R 16V 100N PM10 R	2802		CER1 0603 NP0 50V 100P PM5 R
2403		CER2 0603 X7R 16V 100N PM10 R	2803		CER1 0603 NP0 50V 270P PM5 R
2425	---	NOT PRESENT	2804		CER1 0603 NP0 50V 180P PM5 R
2450	---	NOT PRESENT	2805		CER2 0805 X7R 16V 220N PM10 R
2451	---	NOT PRESENT	2806		CER2 0603 X7R 50V 2N7 PM10 R
2452	---	NOT PRESENT	2807		CER1 0603 NP0 50V 220P PM5 R
2453	---	NOT PRESENT	2809	482212412194	ELCAP SM VS 50V 2U2 PM20 R
2454	---	NOT PRESENT	2810		CER2 0805 X7R 25V 100N PM10 R
2455		RST SM 0603 JUMP. MAX 0R05 R	2811		CER2 0805 X7R 25V 100N PM10 R
2456		RST SM 0603 JUMP. MAX 0R05 R	2812		CER2 0805 X7R 25V 100N PM10 R
2459	---	NOT PRESENT	2813	482212481061	ELCAP SM VS 6V3 22U PM20 R
2460	---	NOT PRESENT	2814		CER2 0603 X7R 50V 10N PM10 R
2461	---	NOT PRESENT	2815		CER2 0805 X7R 25V 100N PM10 R
2462		RST SM 0603 JUMP. MAX 0R05 R	2816		CER2 0805 X7R 16V 220N PM10 R
2463		RST SM 0603 JUMP. MAX 0R05 R	2817	---	NOT PRESENT
2464		CER1 0603 NP0 50V 22P PM5 R	2818	---	NOT PRESENT
2465		CER1 0603 NP0 50V 22P PM5 R	2819		CER2 0805 X7R 25V 100N PM10 R
2466		CER1 0603 NP0 50V 22P PM5 R	2820	482212412085	ELCAP SM VS 16V 100U PM20 R
2473		CER2 0603 X7R 50V 1N PM10 R	2821		CER2 0805 X7R 16V 220N PM10 R
2474		CER2 0603 X7R 50V 1N PM10 R	2822		CER2 0805 X7R 25V 100N PM10 R
2475		CER2 0805 X7R 16V 220N PM10 R	2823		CER2 0805 X7R 16V 220N PM10 R
2476		CER2 0805 X7R 16V 220N PM10 R	2824		CER2 0805 X7R 16V 47N PM10 R
2477		CER2 0805 X7R 16V 220N PM10 R	2825		CER2 0805 X7R 25V 100N PM10 R
2478		CER2 0805 X7R 16V 220N PM10 R	2826		CER2 0805 X7R 25V 100N PM10 R
2479		CER2 0805 X7R 16V 220N PM10 R	2827	482212481061	ELCAP SM VS 6V3 22U PM20 R
2480		CER2 0805 X7R 16V 220N PM10 R	2828		CER2 0805 X7R 16V 220N PM10 R
2481	---	NOT PRESENT	2829		CER2 0805 X7R 16V 47N PM10 R
2482	---	NOT PRESENT	2830		CER2 0805 X7R 16V 47N PM10 R
2483	---	NOT PRESENT	2831		CER2 0805 X7R 25V 100N PM10 R
2500		CER2 0603 X7R 16V 100N PM10 R	2832		CER2 0805 X7R 25V 100N PM10 R
2501		CER2 0603 X7R 16V 100N PM10 R	2834		CER2 0805 X7R 16V 220N PM10 R
2502		CER2 0603 X7R 16V 100N PM10 R	2835		CER2 0805 X7R 16V 220N PM10 R
2503		CER2 0603 X7R 16V 100N PM10 R	2836	---	NOT PRESENT
2504	---	NOT PRESENT	2837	---	NOT PRESENT
2505	---	NOT PRESENT	2838		CER2 1210 Y5V 10V 22U P8020 R
2506	---	NOT PRESENT	2839		CER2 1210 Y5V 10V 22U P8020 R
2507	---	NOT PRESENT	2840		CER2 0805 X7R 16V 220N PM10 R
2508		CER2 0603 X7R 16V 100N PM10 R	2842	---	NOT PRESENT
2509		CER2 0603 X7R 16V 100N PM10 R	2844	---	NOT PRESENT
2517	---	NOT PRESENT	2845		CER2 0805 X7R 50V 2N7 PM10 R
2650		CER2 0603 X7R 50V 470P PM10 R	2846		CER2 0805 X7R 50V 2N7 PM10 R
2651		CER2 0603 X7R 50V 470P PM10 R	2847		CER2 0603 X7R 50V 10N PM10 R
2652		CER2 0603 X7R 50V 470P PM10 R	2848		CER2 0805 X7R 16V 220N PM10 R
2653		CER2 0603 X7R 50V 470P PM10 R	2849		CER2 0805 X7R 16V 220N PM10 R
2654		CER2 0603 X7R 50V 1N PM10 R	2900		RST SM 0603 JUMP. MAX 0R05 R
2655		CER2 0603 X7R 50V 1N PM10 R	2901		RST SM 0805 JUMP. MAX 0R05 R
2656		CER1 0603 NP0 50V 100P PM5 R	2902		RST SM 0603 JUMP. MAX 0R05 R
2657		CER1 0603 NP0 50V 100P PM5 R	2904	---	NOT PRESENT
2658		CER2 0603 X7R 50V 1N PM10 R	2906	---	NOT PRESENT
2659		CER2 0603 X7R 50V 1N PM10 R	2908	---	NOT PRESENT
2660		CER2 0603 X7R 50V 1N PM10 R	2909		CER2 0805 X7R 25V 100N PM10 R
2661		CER1 0603 NP0 50V 100P PM5 R	3000	---	NOT PRESENT
2662		CER1 0603 NP0 50V 100P PM5 R	3001	---	NOT PRESENT
2663		CER2 0805 X7R 16V 220N PM10 R	3002	---	NOT PRESENT
2664		CER1 0603 NP0 50V 10P PM5 R	3003	---	NOT PRESENT
2665		CER2 0805 X7R 16V 220N PM10 R	3004	---	NOT PRESENT
2666		CER2 0805 X7R 16V 220N PM10 R	3015	---	NOT PRESENT
2667		CER2 0805 X7R 16V 220N PM10 R	3016	---	NOT PRESENT
2668		CER2 0805 X7R 50V 1N PM10 R	3054		RST SM 0805 RC11 1M PM5 R
2669		CER2 0805 X7R 50V 1N PM10 R	3055		RST SM 0805 RC11 470R PM5 R
2670		CER2 0805 X7R 50V 1N PM10 R	3063		RST SM 0805 RC11 10R PM5 R
2671		CER2 0805 X7R 50V 1N PM10 R	3066		RST SM 0805 RC11 39R PM5 R
2672		CER2 0603 X7R 50V 1N PM10 R	3067		RST SM 0805 RC11 39R PM5 R
2673		CER1 0603 NP0 50V 10P PM5 R	3068		RST SM 0805 RC11 39R PM5 R
2674		CER2 0805 X7R 50V 33N PM10 R	3069		RST SM 0805 RC11 100R PM5 R
2675		CER2 1206 Y5V 10V 10U P8020 R	3100		RST SM 0805 RC11 10K PM5 R
2676		CER2 0805 X7R 16V 220N PM10 R	3101		RST SM 0805 RC11 10K PM5 R
2677		CER2 0805 Y5V 6V3 10U P8020 R	3102	---	NOT PRESENT
2678		CER2 1206 Y5V 10V 10U P8020 R	3103	---	NOT PRESENT
2679		CER2 1210 Y5V 10V 22U P8020 R	3104		RST SM 0805 RC11 2K2 PM5 R
2680		CER1 0603 NP0 50V 100P PM5 R	3105		RST SM 0805 RC12H 560R PM1 R
2681		CER2 0603 X7R 50V 1N PM10 R	3106		RST SM 0805 RC12H 560R PM1 R
2682		CER2 0805 X7R 100V 4N7 PM10 R	3107		RST SM 0805 RC11 2K7 PM5 R
2683	---	NOT PRESENT	3108		RST SM 0805 RC11 1K PM5 R
2684	---	NOT PRESENT	3109		RST SM 0805 RC12H 56K PM1 R
2685		CER2 0603 X7R 50V 10N PM10 R	3110		RST SM 0805 RC11 47R PM5 R
2686		CER2 1206 Y5V 10V 10U P8020 R	3111		RST SM 0805 RC11 47R PM5 R
2700		CER2 0603 X7R 16V 100N PM10 R	3112		RST SM 0805 RC11 470R PM5 R

3113		RST SM 0805 RC11 470R PM5 R	3215		RST SM 0805 RC11 1K PM5 R
3114		RST SM 0805 RC11 470R PM5 R	3216		RST SM 0805 RC11 10K PM5 R
3115		RST SM 0805 RC11 470R PM5 R	3217		RST SM 0805 RC11 1K PM5 R
3116		RST SM 0805 RC12H 560R PM1 R	3218		RST SM 0805 RC11 10K PM5 R
3117	—	NOT PRESENT	3219		RST SM 0805 RC11 1K PM5 R
3118	—	NOT PRESENT	3220		RST SM 0805 RC11 470K PM5 R
3119	—	NOT PRESENT	3221		RST SM 0805 RC11 2K7 PM5 R
3120	—	NOT PRESENT	3222		RST SM 0805 RC12H 1K8 PM1 R
3121	—	NOT PRESENT	3223		RST SM 0805 RC12H 5K1 PM1 R
3122	—	NOT PRESENT	3224		RST SM 0805 RC11 47R PM5 R
3123	—	NOT PRESENT	3225		RST SM 0805 RC11 180R PM5 R
3124	—	NOT PRESENT	3226		RST SM 0805 RC11 180R PM5 R
3125	—	NOT PRESENT	3227		RST SM 0805 RC11 4K7 PM5 R
3126	—	NOT PRESENT	3228		RST SM 0805 RC11 2K7 PM5 R
3127	—	NOT PRESENT	3229		RST SM 0805 RC12H 5K6 PM1 R
3128	—	NOT PRESENT	3230		RST SM 0805 RC12H 5K1 PM1 R
3129	—	NOT PRESENT	3231		RST SM 0805 RC11 180R PM5 R
3130	—	NOT PRESENT	3232		RST SM 0805 RC11 10K PM5 R
3131	—	NOT PRESENT	3233		RST SM 0805 RC11 10K PM5 R
3132	—	NOT PRESENT	3250		RST SM 0805 RC11 100K PM5 R
3133	—	RST SM 0805 RC11 100R PM5 R	3251		RST SM 0805 RC12H 10K PM1 R
3134	—	NOT PRESENT	3252		RST SM 0805 RC12H 10K PM1 R
3135		RST SM 0805 RC11 100R PM5 R	3253		RST SM 0805 RC12H 56K PM1 R
3136		RST SM 0805 RC11 10K PM5 R	3254		RST SM 0805 RC12H 10K PM1 R
3137		RST SM 0805 RC11 100R PM5 R	3255		RST SM 0805 RC12H 10K PM1 R
3139		RST SM 0805 RC11 2K2 PM5 R	3256	232261513103	NTC SM 0805 OW21 10K PM5 R
3141		RST SM 0805 RC11 180R PM5 R	3257		RST SM 0805 RC11 4K7 PM5 R
3142		RST SM 0805 RC11 47R PM5 R	3259		RST SM 0805 RC11 4K7 PM5 R
3143	—	NOT PRESENT	3260		RST SM 0805 JUMP. MAX 0R05 R
3148		RST SM 0805 RC11 180R PM5 R	3261		RST SM 0805 RC11 4K7 PM5 R
3149		RST SM 0805 RC11 10K PM5 R	3262		RST SM 0805 RC11 10K PM5 R
3150		RST SM 0805 RC11 10K PM5 R	3263		RST SM 0805 RC11 10K PM5 R
3151		RST SM 0805 RC11 47R PM5 R	3264		RST SM 0805 RC11 10K PM5 R
3152	—	NOT PRESENT	3265		RST SM 0805 RC11 33K PM5 R
3161		RST SM 0805 RC11 47R PM5 R	3266		RST SM 0805 RC11 22K PM5 R
3162		RST SM 0805 RC11 10K PM5 R	3267		RST SM 0805 RC11 15K PM5 R
3163		RST SM 0805 RC11 2K2 PM5 R	3268		RST SM 0805 RC11 22K PM5 R
3164	—	NOT PRESENT	3269	—	NOT PRESENT
3167		RST SM 0805 RC12H 1K5 PM1 R	3270		RST SM 0805 RC12H 56K PM1 R
3168		RST SM 0805 RC12H 1K5 PM1 R	3271	—	NOT PRESENT
3169		RST SM 0805 RC12H 1K8 PM1 R	3273		RST SM 0805 RC11 100K PM5 R
3170		RST SM 0805 RC12H 1K PM1 R	3274	—	NOT PRESENT
3171		RST SM 0805 RC12H 1K PM1 R	3275		RST SM 0805 RC11 22K PM5 R
3172		RST SM 0805 RC12H 1K PM1 R	3276		RST SM 0805 RC12H 56K PM1 R
3173		RST SM 0805 RC12H 1K8 PM1 R	3277		RST SM 0805 RC11 220K PM5 R
3174		RST SM 0805 RC12H 1K8 PM1 R	3278	—	NOT PRESENT
3175		RST SM 0805 RC12H 1K8 PM1 R	3279		RST SM 0805 RC11 22K PM5 R
3176		RST SM 0805 RC12H 2K2 PM1 R	3280		RST SM 0805 RC12H 56K PM1 R
3177		RST SM 0805 RC12H 2K2 PM1 R	3281		RST SM 0805 RC11 100K PM5 R
3178		RST SM 0805 RC12H 2K2 PM1 R	3282		RST SM 0805 RC11 10K PM5 R
3179		RST SM 0805 RC11 10R PM5 R	3283		RST SM 0805 RC11 10K PM5 R
3180		RST SM 0805 RC11 10R PM5 R	3286		RST SM 0805 RC11 4K7 PM5 R
3181		RST SM 0805 RC11 10R PM5 R	3287		RST SM 0805 RC11 100R PM5 R
3182		RST SM 0805 RC11 10R PM5 R	3288		RST SM 0805 RC11 10K PM5 R
3183		RST SM 0805 RC11 10R PM5 R	3290		RST SM 0805 RC11 10K PM5 R
3184		RST SM 0805 RC11 47R PM5 R	3291		RST SM 0805 RC11 4K7 PM5 R
3185		RST SM 0805 RC11 180R PM5 R	3300	—	NOT PRESENT
3186		RST SM 0805 RC11 180R PM5 R	3301		RST SM 0805 RC11 22K PM5 R
3187		RST SM 0805 RC11 47R PM5 R	3302		RST SM 0805 RC11 22K PM5 R
3188		RST SM 0805 RC11 180R PM5 R	3303		RST SM 0805 RC11 82K PM5 R
3189		RST SM 0805 RC11 180R PM5 R	3304		RST SM 0805 RC11 4K7 PM5 R
3190		RST SM 0805 RC11 47R PM5 R	3305		RST SM 0805 RC11 470K PM5 R
3191		RST SM 0805 RC11 180R PM5 R	3306		RST SM 0805 RC11 10K PM5 R
3192		RST SM 0805 RC11 180R PM5 R	3307	—	NOT PRESENT
3193		RST SM 0805 RC11 180R PM5 R	3308		RST SM 0805 RC11 22K PM5 R
3200		RST SM 0805 RC11 150K PM5 R	3309		RST SM 0805 RC11 22K PM5 R
3201		RST SM 0805 RC11 1K PM5 R	3310	—	NOT PRESENT
3202		RST SM 0805 RC11 1K PM5 R	3311		RST SM 0805 RC11 1K5 PM5 R
3203		RST SM 0805 RC11 1K PM5 R	3312		RST SM 0805 RC11 470K PM5 R
3204		RST SM 0805 RC11 4K7 PM5 R	3313	—	NOT PRESENT
3205		RST SM 0805 RC11 27K PM5 R	3314		RST SM 0805 RC11 22K PM5 R
3206		RST SM 0805 RC11 33K PM5 R	3315	—	NOT PRESENT
3207		RST SM 0805 RC11 27K PM5 R	3316		RST SM 0805 RC11 1K PM5 R
3208		RST SM 0805 RC11 27K PM5 R	3317	—	NOT PRESENT
3209	—	NOT PRESENT	3318		RST SM 0805 RC11 10K PM5 R
3210		RST SM 0805 RC11 10K PM5 R	3319	—	NOT PRESENT
3211		RST SM 0805 RC11 10K PM5 R	3320	—	NOT PRESENT
3212		RST SM 0805 RC11 10K PM5 R	3321		RST SM 0805 RC11 22K PM5 R
3213		RST SM 0805 RC11 1K PM5 R	3322		RST SM 0805 RC11 22K PM5 R
3214		RST SM 0805 RC11 470K PM5 R	3323	—	NOT PRESENT

3324		RST SM 0805 RC11 22K PM5 R	3687		RST SM 0805 RC11 4K7 PM5 R
3325		RST SM 0805 RC11 470K PM5 R	3800		RST SM 0805 RC11 4K7 PM5 R
3326	---	NOT PRESENT	3801		RST SM 0805 RC11 4K7 PM5 R
3327	---	NOT PRESENT	3802		RST SM 0805 RC11 4K7 PM5 R
3329		RST SM 0805 RC11 22K PM5 R	3803		RST SM 0805 RC11 4K7 PM5 R
3330		RST SM 0805 RC11 10K PM5 R	3804		RST SM 0805 RC11 1K2 PM5 R
3331		RST SM 0805 RC11 22K PM5 R	3805		RST SM 0805 RC11 10K PM5 R
3332	---	NOT PRESENT	3806		RST SM 0805 RC11 10K PM5 R
3333		RST SM 0805 RC11 10R PM5 R	3807		RST SM 0805 RC11 10K PM5 R
3334		RST SM 0805 RC11 4K7 PM5 R	3808		RST SM 0805 RC11 120K PM5 R
3335	---	NOT PRESENT	3809		RST SM 0805 RC11 150K PM5 R
3336	---	NOT PRESENT	3810		RST SM 0805 RC11 33K PM5 R
3337	---	NOT PRESENT	3811		RST SM 0805 RC11 27K PM5 R
3338	---	NOT PRESENT	3812	---	NOT PRESENT
3340		RST SM 0805 RC11 100K PM5 R	3813		RST SM 0805 RC11 22K PM5 R
3342		RST SM 0805 RC11 10K PM5 R	3814		RST SM 0805 RC11 15K PM5 R
3343		RST SM 0805 RC11 100R PM5 R	3815		RST SM 0805 RC11 4K7 PM5 R
3344	---	NOT PRESENT	3816		RST SM 0805 RC11 4K7 PM5 R
3345	---	NOT PRESENT	3817		RST SM 0805 RC11 1M PM5 R
3346	---	NOT PRESENT	3818		RST SM 0805 RC11 1K PM5 R
3347	---	NOT PRESENT	3819		RST SM 0805 RC11 2K2 PM5 R
3348	---	NOT PRESENT	3820		RST SM 0805 RC11 2K2 PM5 R
3349		RST SM 0805 RC11 2K2 PM5 R	3821		RST SM 0805 RC11 47R PM5 R
3350		RST SM 0805 RC11 2K2 PM5 R	3822		RST SM 0805 RC11 22K PM5 R
3351		RST SM 0805 RC11 10K PM5 R	3823		RST SM 0805 RC11 24K PM5 R
3352		RST SM 0805 RC11 5K6 PM5 R	3824		RST SM 0805 RC11 24K PM5 R
3353		RST SM 0805 RC11 1K PM5 R	3825		RST SM 0805 RC11 4K7 PM5 R
3411	---	NOT PRESENT	3826		RST SM 0805 RC11 4K7 PM5 R
3412	---	NOT PRESENT	3827		RST SM 0805 RC11 2K2 PM5 R
3450	---	NOT PRESENT	3828		RST SM 0805 RC11 2K2 PM5 R
3451	---	NOT PRESENT	3829		RST SM 0805 RC11 10K PM5 R
3452	---	NOT PRESENT	3830		RST SM 0805 RC11 10K PM5 R
3453		RST SM 0805 RC11 10K PM5 R	3831		RST SM 0805 RC11 1K2 PM5 R
3454		RST SM 0805 RC11 10K PM5 R	3832		RST SM 0805 RC11 10K PM5 R
3455	---	NOT PRESENT	3833		RST SM 0805 RC11 10K PM5 R
3456	---	NOT PRESENT	3834	---	NOT PRESENT
3457	---	NOT PRESENT	3835		RST SM 0805 RC11 1M PM5 R
3458	---	NOT PRESENT	3836		RST SM 0805 RC11 1M PM5 R
3459	---	NOT PRESENT	3837		RST SM 0805 RC11 10K PM5 R
3460	---	NOT PRESENT	3838		RST SM 0805 RC11 1K2 PM5 R
3461	---	NOT PRESENT	3839	---	NOT PRESENT
3465		RST SM 0805 RC11 10K PM5 R	3900	---	NOT PRESENT
3470		RST SM 0805 RC11 220R PM5 R	3902	---	NOT PRESENT
3471		RST SM 0805 RC11 220R PM5 R	3904	---	NOT PRESENT
3472	---	NOT PRESENT	5000	---	NOT PRESENT
3473	---	NOT PRESENT	5001	---	NOT PRESENT
3474	---	NOT PRESENT	5100	242253595221	IND FXD SM 0805 0U82 PM10 R
3475	---	NOT PRESENT	5200	482215770935	COIL ASSY 97UH 10A
3476	---	NOT PRESENT	5201	242253594905	IND FIX SM 7A06L 12U PM10 R
3477	---	NOT PRESENT	5202	482252610596	IND FXD SM EMI 8.9/3/3-452 R
3478	---	NOT PRESENT	5203	532252610706	IND FXD SM EMI 100MHZ 50R R
3500		RST SM 0805 RC11 10K PM5 R	5204	532252610706	IND FXD SM EMI 100MHZ 50R R
3504		RST SM 0805 RC11 10K PM5 R	5205	242254944392	IND FXD SM EMI 100MHZ 30R R
3650		RST SM 0805 RC11 100R PM5 R	5206	242254944392	IND FXD SM EMI 100MHZ 30R R
3651	---	NOT PRESENT	5207	242253594905	IND FIX SM 7A06L 12U PM10 R
3652		RST SM 0805 RC11 10K PM5 R	5208	242253594905	IND FIX SM 7A06L 12U PM10 R
3653		RST SM 0805 RC11 1K5 PM5 R	5209	482252610596	IND FXD SM EMI 8.9/3/3-452 R
3654		RST SM 0805 RC11 1K5 PM5 R	5450	---	NOT PRESENT
3655		RST SM 0805 RC11 10K PM5 R	5451	---	NOT PRESENT
3656		RST SM 0805 RC11 150K PM5 R	5800	482215711119	IND FXD SM 0805 2U7 PM10 R
3657		RST SM 0805 RC11 10K PM5 R	6100	482213011397	DIO SIG SM BAS316 (PHSE) R
3658		RST SM 0805 RC11 100R PM5 R	6101	---	NOT PRESENT
3659		RST SM 0805 RC11 10K PM5 R	6102	---	NOT PRESENT
3660		RST SM 0805 RC11 4R7 PM5 R	6105	532213034337	DIO SIG SM BAV99 (INFI) R
3661		RST SM 0805 RC11 100R PM5 R	6107	532213034337	DIO SIG SM BAV99 (INFI) R
3662		RST SM 0805 RC11 1M PM5 R	6109	532213034337	DIO SIG SM BAV99 (INFI) R
3663		RST SM 0805 RC11 4K7 PM5 R	6200	931200440668	DIO SM SBYT03-400 (ST00) R
3664		RST SM 0805 RC11 100R PM5 R	6201	482213010185	DIO REG SM UDZ55.6B (RHMO) R
3665		RST SM 0805 RC11 100R PM5 R	6202	482213011397	DIO SIG SM BAS316 (PHSE) R
3666		RST SM 0805 RC11 100R PM5 R	6203	482213011013	DIO REG SM UDZ16B (RHMO) R
3670		RST SM 0805 RC11 1K PM5 R	6204	---	NOT PRESENT
3671		RST SM 0805 RC11 1K PM5 R	6206	532213034331	DIO SIG SM BAV70 (PHSE) R
3672		RST SM 0805 RC11 1K PM5 R	6208	482213011397	DIO SIG SM BAS316 (PHSE) R
3680		RST SM 0805 RC11 10K PM5 R	6209	482213011013	DIO REG SM UDZ16B (RHMO) R
3681		RST SM 0805 RC11 100K PM5 R	6210	532213034331	DIO SIG SM BAV70 (PHSE) R
3682		RST SM 0805 RC11 8K2 PM5 R	6213	932208569668	DIO REC SM MBR51100 (MOTA) R
3683	---	NOT PRESENT	6214	482213011397	DIO SIG SM BAS316 (PHSE) R
3684	---	NOT PRESENT	6215	932208569668	DIO REC SM MBR51100 (MOTA) R
3685	---	NOT PRESENT	6216	482213011397	DIO SIG SM BAS316 (PHSE) R
3686		RST SM 0805 RC11 10K PM5 R	6252	482213033997	DIO SIG SM BAS19 (PHSE) R

6253	482213033997	DIO SIG SM BAS19 (PHSE) R	7204	932213094668	IC SM LE80CD (ST00) R
6254	532213034337	DIO SIG SM BAV99 (INFI) R	7205	482213060373	TRA SIG SM BC857B (PHSE) R
6255	---	NOT PRESENT	7206	532213060803	FET SIG SM BST82 (PHSE) S
6256	532213034337	DIO SIG SM BAV99 (INFI) R	7207	532213060159	TRA SIG SM BC847B (PHSE) R
6300	---	NOT PRESENT	7208	482213060373	TRA SIG SM BC857B (PHSE) R
6301	482213033997	DIO SIG SM BAS19 (PHSE) R	7209	532213060803	FET SIG SM BST82 (PHSE) S
6302	532213034337	DIO SIG SM BAV99 (INFI) R	7210	932211663668	IC SM LT1376CS16,SL30399 (LTC)
6304	---	NOT PRESENT	7211	932214179668	IC SM LTC947IS8 (LTC0) R
6305	---	NOT PRESENT	7212	932211663668	IC SM LT1376CS16,SL30399 (LTC)
6306	---	NOT PRESENT	7213	482213060373	TRA SIG SM BC857B (PHSE) R
6308	---	NOT PRESENT	7214	482213060373	TRA SIG SM BC857B (PHSE) R
6309	532213034337	DIO SIG SM BAV99 (INFI) R	7215	482213061553	TRA SIG SM PDTC124EU (PHSE) R
6310	---	NOT PRESENT	7250	932213093668	IC SM LE50CD (ST00) R
6311	---	NOT PRESENT	7251	932213095668	IC SM LTC1391IS (LTC0) R
6312	---	NOT PRESENT	7252	932213241668	IC SM LTC1598I (LTC0) R
6314	---	NOT PRESENT	7253	932213304668	IC SM LT1634BIS8-1.25 (LTC0) R
6315	---	NOT PRESENT	7254	933738280623	IC SM MC3302D (PHSE) R
6316	---	NOT PRESENT	7255	932213290668	IC SM TS912ID (ST00) R
6317	---	NOT PRESENT	7300	933738280623	IC SM MC3302D (PHSE) R
6318	482213011397	DIO SIG SM BAS316 (PHSE) R	7301	482213061553	TRA SIG SM PDTC124EU (PHSE) R
6319	482213011397	DIO SIG SM BAS316 (PHSE) R	7303	482213042615	TRA SIG SM BC817-40 (PHSE) R
6320	---	NOT PRESENT	7304	532213060159	TRA SIG SM BC847B (PHSE) R
6321	---	NOT PRESENT	7400	932213218668	IC SM DT28F320S3-110 (ITLO) R
6322	---	NOT PRESENT	7401	932213218668	IC SM DT28F320S3-110 (ITLO) R
6323	---	NOT PRESENT	7402	932213218668	IC SM DT28F320S3-110 (ITLO) R
6324	311239913491	ZENER 4.3V	7403	932213218668	IC SM DT28F320S3-110 (ITLO) R
6450	---	NOT PRESENT	7450	---	NOT PRESENT
6451	---	NOT PRESENT	7451	---	NOT PRESENT
6600	482213011397	DIO SIG SM BAS316 (PHSE) R	7453	---	NOT PRESENT
6800	482213011188	DIO REC SM MBRD340 (MOTA) R	7456	482220915147	IC SM LT1181AIS (LTC0) R
6801	482213011397	DIO SIG SM BAS316 (PHSE) R	7457	935209170118	IC SM 74LVT14D (PHSE) R
6802	482213011397	DIO SIG SM BAS316 (PHSE) R	7458	---	NOT PRESENT
6803	482213011397	DIO SIG SM BAS316 (PHSE) R	7459	---	NOT PRESENT
6804	482213011397	DIO SIG SM BAS316 (PHSE) R	7500	932214533685	IC SM KM416V4104CSI-6 (SMGK)
6805	532213034337	DIO SIG SM BAV99 (INFI) R	7501	932214533685	IC SM KM416V4104CSI-6 (SMGK)
6806	532213034337	DIO SIG SM BAV99 (INFI) R	7502	---	NOT PRESENT
6807	532213034331	DIO SIG SM BAV70 (PHSE) R	7503	---	NOT PRESENT
7000	---	NOT PRESENT	7556	311232855100	UNIT GYRO EWTS4M012 SELECTED (22SY591/23)
7053	482220915189	IC SM MC74AC04D (MOTA) R	7556	---	NOT PRESENT (22SY591/23S)
7100	---	NOT PRESENT	7650	311230054980	IC SM SPIL3A TMPR3908TB
7101	482220930211	IC SM 74HCT03D (PHSE) R	7651	482213061553	TRA SIG SM PDTC124EU (PHSE) R
7102	532213060159	TRA SIG SM BC847B (PHSE) R	7652	482213061553	TRA SIG SM PDTC124EU (PHSE) R
7103	482213060373	TRA SIG SM BC857B (PHSE) R	7680	482220930857	IC SM 74HCT107D (PHSE) R
7104	---	NOT PRESENT	7681	933714140653	IC SM 74HCT132D (PHSE) R
7105	---	NOT PRESENT	7683	482213061553	TRA SIG SM PDTC124EU (PHSE) R
7106	---	NOT PRESENT	7684	482213061553	TRA SIG SM PDTC124EU (PHSE) R
7107	---	NOT PRESENT	7685	---	NOT PRESENT
7108	---	NOT PRESENT	7686	---	NOT PRESENT
7109	532213060159	TRA SIG SM BC847B (PHSE) R	7687	482213060373	TRA SIG SM BC857B (PHSE) R
7110	532213060159	TRA SIG SM BC847B (PHSE) R	7688	482213061553	TRA SIG SM PDTC124EU (PHSE) R
7111	532213060159	TRA SIG SM BC847B (PHSE) R	7800	482220916339	IC SM MSM6585GS-K (OKIO) R
7112	932207276668	IC SM LT1260IS (LTC0) R	7801	482220933629	IC TDA7375 (ST00) L
7114	---	NOT PRESENT	7802	532213060159	TRA SIG SM BC847B (PHSE) R
7115	482213060373	TRA SIG SM BC857B (PHSE) R	7803	482213061553	TRA SIG SM PDTC124EU (PHSE) R
7116	482213060373	TRA SIG SM BC857B (PHSE) R	7804	932208267668	IC SM TDA7342 (ST00) R
7117	532220911473	IC SM 74HCT86D (PHSE) R	7805	532220932344	IC SM TDA7052AT/N2 (PHSE) R
7118	---	NOT PRESENT	7806	---	NOT PRESENT
7119	482213060373	TRA SIG SM BC857B (PHSE) R	7807	932213290668	IC SM TS912ID (ST00) R
7200	532213060159	TRA SIG SM BC847B (PHSE) R	7808	482213061553	TRA SIG SM PDTC124EU (PHSE) R
7201	482220914815	IC SM VN065P (ST00) R	7809	482213061553	TRA SIG SM PDTC124EU (PHSE) R
7202	932213093668	IC SM LE50CD (ST00) R	7900	---	NOT PRESENT
7203	932213093668	IC SM LE50CD (ST00) R	7901	---	NOT PRESENT